Block Island Economic Development Foundation, Inc.
Block Island, Rhode Island 02807

# BLOCK ISLAND ENERGY INSTITUTIONS REPORT:
# CAN BLOCK ISLAND SURVIVE AS A COMMUNITY?



A report about energy on Block Island prepared for the Town of New Shoreham and the people of Block Island under the auspices of the Block Island Economic Development Foundation, Inc., and the Town Of New Shoreham Energy Committee. Funds provided through the Governor's Energy Office, State of Rhode Island, under a grant from the Coastal Energy Impact Program, National Oceanic Atmospheric Administration, United States Department of Commerce.

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P.O. Box 619
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(401) 466-2861

July 1982

Figure 1

ENERGY USE ON BLOCK ISLAND
1979-1980

| | Residential | Commercial | Publ Auth & St Lghts | TOTAL ONE YEAR |
|---|---|---|---|---|
| Electricity $.26-$.32 KWH | 1,552,000 KWH<br>229 MBtu | 1,500,000 KWH<br>5,121 MBtu | 445,800 KWH *1<br>1,522 MBtu | 2,397,800 KWH (22%eff.)<br>11,943 MBtu |
| Oil #2 $1.34/gal | 353,551 gal<br>49,143 MBtu | | 5,706 galTown<br>2,000 galSPl<br>772 KBtu | 353,551 gal<br>49,143 MBtu |
| Propane $31.50/tank | 7,351 tanks<br>15,806.5 MBtu | | | 7,351 tanks<br>15,806.5 MBtu |
| Gasoline $1.60/gal | 254,610 gal<br>28,071 MBtu | 59,035 gal *2<br>6,508 MBtu | | 313,645 gal<br>34,579 MBtu |
| Diesel $1 /gal | 20,168 gal +<br>36,346 gal =<br>56,514 gal | | 40,000 gal Sewer Plnt<br>5,417 MBtu *5 | 60,314 MBtu *3 in non-transportation |
| Coal $120/ton | 84 tons<br>2,133.6 MBtu | | | 84 tons<br>2,133.6 MBtu |
| Wood *6 $82-150/c | 100 cords<br>1,400 MBtu<br>average value | | | 100 cords<br>1,400 MBtu |
| Solar $2000-3500 water system | 10 Collectors<br>+ 1 unit PV<br>+ boat units | 2 Collectors | | |
| Wind $23,000/ 10k syst | 301,947 kwh<br>1,031 MBtu<br>+ 2 unknown | | | Est.350,000kwh in norm operat |
| Kerosene #1 *4 | 20,241 gal<br>2,558 MBtu | | | 20,241 gal<br>2,558 MBtu |

NOTES: *1 Estimated figures, does not include sewer plant's own generation which is 65KW on summer peak; 332,880 kwh at 38KW demand.
*2 Figures from only one dealer, does not include marinas.
*3 Average use of Power Company 33,780 per month 1/80-6/81, 505,360 gallons X 135,425 Btu/gal = 54,896 MBtu dieselfuel.
*4 It is reported that the present #1 oil is kerosene.
*5 Sewer plant reports 40,000 gallons for 1981 fiscal year. This translates to 5,417 MBtu which added to Power Company makes total of 60,313 MBtu of diesel fuel used for electricity.
*6 Conversion factor for wood based on 7,000 Btu per pound; low figure woods vary in Btu content.

Block Island Energy Report Issued: Public Meeting Planned.

The Block Island Economic Development Foundation and the Town of New Shoreham Energy Committee have issue a report on the energy future of Block Island. The report is entitled "Block Island Integrated Energy Institutions Report: Can Block Island Survive as a Community?". Since energy costs are a major impact on the economy of the island the purpose of the report is to suggest, using multi-disciplinary research, how prices may be stabilized in a manner consistent with the Block Island heritage.

The major conclusions of the report are as follows:

Since garbage is a economic and environmental problem for the Island, recovery of energy from and reduction in volume of solid waste can and should be accomplished. Available biomass such as peat and seaweed should supplement Island produced wastes. Particular solutions proposed are incineration or gasification for the production of energy. To reduce volume, waste can be separated and certain components sold.

The use of windpower on Block Island is feasible if appropriate institutional arrangements are developed.

Power generated at the town sewer plant can be used if the price relationship between cost of diesel fuel on the one hand and what would be paid for electricity and waste heat from the sewer plant benefits the town.

The financial structure of the Block Island Power Company presently discourages energy conservation and use of alternative energy sources. Promotion of such options might be encouraged it the Power Company were restructured or sold to its users.

An electric cable to the mainland is far more expensive than any of the other alternatives and should not be considered at this time.

Conservation, along with more efficient use of energy, should be encouraged through use of the RISE program (state energy audit) and a revolving loan program.

The Block Island report is partially modeled on a one done for the state of Hawaii in 1980: "The Hawaii Integrated Energy Report". That report was funded by $500,000 of federal money. In contrast, the Block Island Report was completed under a $22,800 grant and contains the substance of the Hawaii report although without some of the technical detail. The text of the Block Island Report is supported by many pages of appendices, much of which material was developed within the course of the project. Among the appendices are complete analyses of environmental considerations in the development of alternative systems for energy production at three sites on the Island and separate environmental studies on peat digging. For the first time, a complete picture of energy use on Block Island has been provided (made possible by the generous cooperation of energy suppliers on the Island). Specific gallonage and British thermal unit usage (a measure of heat value) are provided.

Many people contributed to the report, including Town officials, and in particular NIcholas dePetrillo, F. Norris Pike and John F. Gray. The coordination and writing were by Elliot Taubman, Esq. and William Stringfellow, Esq. Some very important biological and factual research was done by Kimberley Gaffett and Julia Hayes. A great deal of time was contributed by Harold Madison, P.E., Russell Larson, P.E., and William Ted Martin, Ph.D., all of whom reside on the Island. Off Island experts included Robert Ericson, M.C.P. of the Governor's Energy Office, Victor Bell, Senior Environmental Planner, Department of Environmental Management, Harry Divitian, Ph.D., of Entek Research, Inc. of East Setauket, New York, Vinod Mubaye, Ph.D, of Brookhaven National Laboratory, Jerome Weingart, Ph.D., of Lawrence-Berkeley Laboratory, Albert Leuschner, M.E. of Cambridge, Massachusetts, and Melvin M. Eisenstadt, Ph.D., J.D., P.E., of Albuquerque, New Mexico. The funds were provided by the Governor's Energy Office through a grant from the Coastal Energy Impact Program of the National Atmosperic and Oceanic Administration, United States Department of Commerce. The Energy Impact Coordinator for Rhode Island, Walter F. Cooper, was quite helpful in the project.

It is planned that the annual meeting of the Block Island Economic Development Foundation, to be be held at 4 p.m. Sunday, July 25, 1982, will be a general public discussion of the Energy Report and suggestions for action. In the interim, the Town of New Shoreham Energy Committee, through a grant from the Farmers' Home Administration to the Rhode Island League of Cities and Towns, is developing specific optional plans for the Town landfill. The institutional background for the proposed plans is set out in the Energy Institutions Report. The Town of New Shoreham Energy Committee and the Block Island Economic Development Foundation have strongly urged all interested persons to attend the July 25 meeting and to be heard on the energy future of Block Island.

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Even in the context of a long range national energy emergency, with its manifold and multiplying economic, political and social consequences evident in practically every sector of American society, Block Island is exceptional because it suffers such extraordinary--and excessive--primary energy costs.

The price of electrical power on Block Island is extraordinary by any measure of comparison with electricity rates for either household or commercial consumers anywhere on the mainland. Island rates vary between three and six times higher than those on the mainland. These rates are excessive because they manifestly and imminently threaten the survival of the indigenous Block Island community, its year-round population, and, inevitably, the Island's inherited way of life, traditional culture and existing social fabric.

Despite its somewhat grandiose title, this project represents a modest effort, undertaken by some Island residents possessed with relevant expertise and professional skills, assisted by some co-opted off-Island experts, under the aegis of the Block Island Economic Development

appointed by the Town Council of New Shoreham, and the Block Island Economic Development Foundation, Inc. The results, to date, of such efforts are not encouraging. Tentative estimates for such an installation come to at least $5,000,000, with carrying charges of approximately $600,000 per annum. The latter charge alone is nearly the current rate base of the local power company, namely $750,000. A cable would have a projected 30-year life, and its cost could be projected over that span; however, increased rates for electricity from the New England Electric System would also have to be assumed during that same 30 year period. What those costs would be is conjecture if only because of the number of variables involved; however, New England Electric System has recently been granted a substantial wholesale rate increase and the highest rate of return ever allowed by the Federal Energy and Regulatory Commission. Additional costs for the maintenance of emergency backup facilities represent another factor difficult, at this point, to calculate. Moreover, there would appear to be a general reluctance on the part of the municipality, in part because of the sewer experience, to enter into any long term financing commitments.

What can be reported with more certainty is that the cable installation estimate of $5,000,000 is

approximately two-thirds higher than an estimate for the same project obtained less than five years ago. The conclusion of this report based upon consultation with a number of knowledgeable consultants, is that a cable connection is not likely to be cost effective or to have a beneficial impact upon power rates. The idea might well have been feasible economically a decade ago, but now it is too late.

2. Wind power: The dismay in the Block Island community about the NASA wind power experiment, and the manner in which that has been conceived and administered does not diminish the significant potential of wind power as an energy resource on the Island. If the NASA program has failed to yield a beneficial impact on electrical rates, it is because NASA has pursued another agenda ignoring the priority of the Island's needs, and not because the wind is not abundantly available to be harnessed. This is not a matter of speculation. While NASA has been malingering, private initiative has demonstrated the feasibility of generating electrical power by windmill. Everett Littlefield, the Islander who has installed a small scale wind energy generator to supply his own household with power, encountered, it should be noted, an uncooperative attitude, if not, indeed, harassment, from the local power company about

Foundation, Inc., and the Town Council appointed Energy Committee, to reconnaissance alternative means of supplying the Island with energy. Within the limits of the project, especially available time and funding, the attempt has been to examine whether such alternatives are compatible with the Island's ecology and environment, to weigh technical and/or legal impediments associated with each of these means, and to project whether any of them could reasonably be expected to have a stabilizing impact upon consumer costs for power promptly enough to spare the indigenous Island community from the threat of virtual extinction.

In other words, this project has been conducted with a realization that if a reordering of energy economics is not possible and feasible in the immediate future, Block Island, as an historic community is doomed. That does not mean that the Island is apt to vanish into the sea. It does mean that if the existing energy supply system continues in its present mode, with consumer costs increasing no more than at a rate and speed similar to that which has prevailed in the past decade, the Island will likely undergo change of a radical, profound and irreversible character. Block Island will lose viability. It will be rendered uninhabitable as a full time, year-round community.

The instant study has, therefore, not only explored possible options for energy resources from a cable connection to the mainland, wind power peat, garbage,

sewage, seaweed, coal and wood, but it has also considered ways of financing the production and distribution of power, however fueled, and it has tried to identify major legal and other technical problems related to one or another of the several alternatives mentioned.

Certain Considerations: From the work involved in the project, which was begun in the summer of 1981, some basic considerations have emerged which can be identified and articulated straightforwardly:

1. It may be too late. If such a project as this had been undertaken a decade earlier, the prospects for reform of the Island's energy economics and achievement of affordable electrical costs might be much more promising. As it is, this project, modest as it is, happens late, perhaps too late to define alternative policy consistent with the survival of the historic community of Block Island.

2. Negative answers are significant. In some instances, this report concludes that a particular option is not or is no longer realistic. Though that be a negative finding, the information is still significant and the effort to reach it worthwhile, if only to spare future pursuit of illusory remedies.

3. A test of efficacy. The plain, simple and singular test of any proposals for alternative power sources and/or for reform of the Island's electrical power system is the potential for favorable impact upon consumer energy costs. Many year-round residents of the Island are skeptical or suspicious of hypothetical schemes or theories which may arrest the imagination of academics or other putative experts but which have little likelihood of yielding prompt empirical benefit. There is equal wariness about remote bureaucrats preoccupied with their in-house agendas but imperious toward the need of Islanders for relief from the staggering prevailing power rates.

Such apprehensions among Island folk are not dismissable as yokel prejudice. Twice in recent experience, Block Island has been victimized by just such circumstances. Some years ago, the Town constructed a sewer system, mandated by federal authorities, which has imposed an enormous, escalating indebtedness upon Islanders. The project, however, was designed according to mainland development projections grossly inappropriate to the Island's ethos and environment, and, in consequence, the system is impressively over-engineered both in terms of the Island's current sewage disposal needs and in terms of

predictable needs which are consistent with the Island's character and ecology.

A somewhat similar melancholy report must be admitted concerning the NASA wind power experiment which was located on the Island about two years ago. The windmill has been managed under such arrangements that its impact upon power rates has been virtually nil. Some knowledgeable residents consider that the experiment is chiefly a public relations endeavor, so far as its federal sponsors are concerned. In any case, the machinery appears to have been designed for primary application--some day--in mainland situations, where "farms" of these machines could be located. Throughout the experiment, official indifference toward the plight of human beings living year-round on Block Island and struggling to cope with fantastic electrical costs has been consistent.

In keeping with considerations such as these, this report is primarily concerned with the prospects, if there be any, of stabilizing power rates in order to enable the full time community to survive for awhile longer. The report is, thus, addressed to the people of the Island community--to those who bear the overwhelming disproportion of the costs of energy on the Island now and to those who stand to suffer most directly and poignantly if no way can be found to moderate such costs--in a hope that it is not yet too late.

The Block Island Situation: Those unfamiliar with Block Island in its present circumstances may consider it hyperbole to cast the existing energy economics of the Island as the issue of the survival of the basic community of the Island. There are other, related factors which jeopardize that year-round community. One, for an example, is the over dependence of the Island upon imports, especially of food and fuel, and the resulting desperate balance of payments problem. That, in turn, is magnified by the volume of cash--profits, income, taxes--generated each summer by the seasonal commerce which is taken off the Island and which prospers the mainland. Only a relatively modest amount of this money remains to circulate on the Island in the wintertime, to provide goods, services and jobs so much needed when the resort trade closes down. Meanwhile, the most stable aspect of the off-season economy is the sale and development of land and the construction of more cottages and second homes for the seasonal visitors which, however, increases demand for municipal services and energy capacity. The burden of paying for this overhead falls disproportionately upon year-round residents, even though the full-time population gradually dwindles and the high costs of land and construction render homesteading prohibitive.

In short, the Island community is caught in acyclical economics which is, in principle, self-defeating. Central

in this picture is the cost of power since that bids up the cost of practically everything else essential to maintaining the full time community. It is that factor, more than any other single reality, which seems most likely to reach a point where the Island residence ceases to an be enviable economy in the off-season, with school and churches and a culture, for families, for retired and elderly persons, for working people or business persons, other than those directly engaged in construction or similar servicing of the resort trade.

If Block Island ceases to be habitable as a year-round society and becomes merely a seasonal enterprise, that manifestation of the Island will predictably become more and more a facade or a replica or a put on for the transients, of the same genre as Williamsburg or Mystic Seaport or Disneyland. The suggestion here is, obviously, that the seasonal commerce needs the civilizing basis of an authentic, historic, living community and of a viable year-round economy in order to spare the ethos of the Island from raw exploitation.

The escalation in the costs of importing fuel to generate electricity on Block Island and the seasonal economic disparity in the costs of maintaining generation capability for the summer influx are not the only explanations for the astronomical power rates which Island residents now pay. The financing arrangements practiced by

the private ownership of the Block Island Power Company furnish a major reason. A 1981 article in the Providence Sunday Journal (Appendix J) addresses this aspect of the situation. Let it be stated here that this project has found no reason for substantial complaint about the quality of service rendered to the community by the employees of the Block Island Power Company, though they, of course, have no influence over management policy or the morality of such policy. At the same time, comment has been noticed on the Island to the effect that the power company underpays its employees, if comparison is made to equivalent responsibilities in mainland utilities.

An evaluation of alternatives: There follow, herewith, brief resumes of findings of the project with respect to the various alternative power sources studied:

1. Electric cable from the mainland: The proposal of an electrical cable between the Island and somewhere on the mainland has been informally discussed for some years. Fisher's Island, among other places in roughly comparable circumstances to those of Block Island, has such a connection. Approaches to possible cable installers and inquiries to the New England Electrical System have recently been undertaken by the Block Island Residents Association, the Energy Committee

his project (specifically about company compliance with federally required buy-back provisions for any surplus power his windmill produces), but that was Littlefield's major problem, rather than any technical matters affecting the feasibility of his installation. The matter was resolved in favor of the alternative energy by P. U. C. order.

Existing Town ordinances provide for such household generators as a special exception in various zones. Whether the Town should adopt a policy encouraging a so-called wind farm, financed privately, raises aesthetic and environmental issues which still require consideration, and what the impact of any such wind farm on the operations of the existing power company might be has yet to be examined either locally or by the State of Rhode Island Public Utilities Commission. This report urges these items to be promptly debated with a bias toward developing favorable policies in the Town Planning Board, the Zoning Board and the Town Council. The issue will be decided in part by the Public Utilities Commission. That is because adoption by the Town,of a regulation favoring alternative energy requires that specific PUC approval be given for any project which will produce more than 5% of the present power production by Block Island Power Company.

The potential of wind power could be significantly enhanced if various storage mechanisms are utilized to extend utilization of the wind. A thorough examination is needed as to environmental and safety aspects of any storage facilities proposed.

Wind power facilities supplying some households and some businesses, with surplus power being sold to the local utility, subject to reasonable state and federal regulation, is one of the more promising alternatives for private investment.

3. Peat: Peat is the historic household fuel of Block Island and in the eighteenth century its abundance and its utilization literally saved the Island's population because it rendered the Island habitable when there was no other source of heating fuel, the trees having all been used.

A University of Rhode Island geological study recently concluded that the Island has sufficient peat deposits to supply its existing power needs for more than a quarter of a century. There are, however, environmental impediments and legal problems associated with its utilization. Harvesting peat essentially involves digging and cleaning existing wetlands, thus producing ponds. An Appendix I contains an analysis of wildlife habitat in four specific Island wetlands which

concludes that conscientious development of peat potential may offer net environmental benefits. The use of peat directly as a fuel raises the question of possible air pollution. The University of Rhode Island, Department of Geology is in the process of preparing a study on the environmental impact of burning peat. Meanwhile, this report concludes that a more efficient utilization would result from compaction of peat before burning and/or from its gasification. The former would provide suitable and safe household fuel, the latter, with possible waste (paper) additives from the Town Landfill, could supply an alternative fuel to imported diesel oil for the generation of electricity.

A major part of the work on this report was the work for permits at the Department of Environment Management and other agencies. The initial permit applications were turned down and after much additional work, a new permit application has been filed with DEM. All appropriate state and local government approvals have already been granted.

From the ancient use of Island peat, there survive a plethora of deeds conferring "peat rights" historically called "tug rights". This project has enabled some preliminary researches on the matter, but more remains to be accomplished. An interim suggestion to those who would dig peat is to give public notice to

others who may have peat rights that peat is being dug. The unresolved legal issues and the serious environmental issues raised, would influence what kind of public or private entity could appropriately cope with the peat potential on Block Island.

4. Resource Recovery: A major cost and environmental problem for Block Island is that of its garbage and sewage disposal. A substantial amount of project time was spent reviewing with state officials and other experts how costs could be reduced and/or energy produced at the Town landfill and sewer plant. In the event that a particular proposal is adopted, it is likely that the Rhode Island Solid Waste Management Authority could guarantee any bonds for a project. The operating agency could be BIED, the Sewer Commission, or a new Town agency. The most feasible option appears to be an incinerator or gasifier at the town landfill with production of electricity to sell back to the power company. The primary permissions needed would be from the State Public Utilities Commission and the Department of Environmental Management. (See appended legal/environmental analysis, Appendix C.) The other option includes use of the existing sewer plant. If the land fill is to be used for energy production, an engineering /planning study such as the one excerpted

from Martha's Vineyard (Appendix D), will have to be conducted. Resources from a grant to the Rhode Island League of Cities and Towns have recently become available to aid in at least part of the planning.

Methane gas is the basic energy fuel available from garbage and sewage. It can be produced from a number of natural biomass resources, including such renewable resources from the sea as seaweed and from the land as crop residue or human and animal wastes. On Block Island, potential sources for menthane production include sewage sludge, seaweed, peat and animal excrement. Some utilities are now utilizing methane produced from waste to generate electricity. A similar potential exists on the Island.

Appendix E is a letter from Albert Leushner, an engineer with expertise on methane production, which makes a preliminary suggestion that methane could be produced from sewer sludge and utilized to fuel the sewer plant diesels. Methane could also be used to fuel vehicles, and a related project could be the utilization of waste heat from the sewer plant in a greenhouse located adjacent to the site of the sewer plant.

The sewer plant has been producing a significant excess of electricity. Its generators are capable of

producing 300 KW of output. The present demand for the sewer operation varies from a high of 65 KW in the summer to less than 20 KW in the winter. It would seem a benefit to the whole community to find a way lawfully to sell this excess power to the locality, especially if a substitute for diesel can be produced that would be more economical than the imported fuel. A preliminary analysis by Robert Ericson, Senior Planner at the Governor's Energy Office (In Appendix G) finds that the Sewer Commission could make a profit selling power back to B. I. Power Co. * Such sales could help to even out the wintertime uneveness of power from a windfarm. A further benefit could be the use of the waste heat from the sewer plant to heat the church barn which BIED intends to use for year-round cottage industry and also, possibly, for a greenhouse to grow food for the Island in the winter.

Economic Reform of the Power Company: It has already been noticed in this report that the financial operation of the Block Island Power Company is a significant impediment to alternative power generation options and to any serious effort to stabilize electrical costs for consumers. It is, in fact, difficult to imagine an economic organization of the power company which would result in higher costs to the rate payers than that represented by the existing financial

* Mr. Ericson completed a "back-of-the envelope" calculation which included the assumption that the waste heat from the sewer plant diesels was actually used and that power was sold back to BIPCo. Norman Dahl, Ph.D., on behalf of the Block Island Residents Association, is doing a more detailed analysis.

structure of the power company. Thus, increasingly, suggestions are heard in the community about possible reform of the situation. Some residents wonder about a municipally owned and operated utility. Some potential investors explore the idea of acquiring the power company as a private venture but with more conscientious efforts to stabilize rates. Others think that a non-profit agency should own and operate the power company, perhaps organized as a cooperative such as are common in rural America.

At the present time the least-cost solution, financing as a rural electric cooperative with 2% money as in Vinalhaven, Maine, is infeasible because of current policies in Washington. The financing of fuel imports appears to be a key element in the costs of the existing operation, with its reliance upon a non-competitive, middleman corporation charging maximum or near maximum interest rates. If those costs could be moderated--or eliminated--it could work a rate adjustment favorable to Islanders. Some communities (e.g. Springfield, Massachusetts) are now organizing "fuel cooperatives" to finance bulk fuel purchases at discounted prices. Their experience may be relevant to the Island's situation. Other possibilities or variations commend themselves to study and evaluation. If acquisition of the power plant is indicated, it should be mentioned that the incumbent ownership bought the power company in 1977 for $320,000.

This report finds that the financial organization of the power company is so relevant to consumer costs for electricity that it recommends that Block Island Economic Development Foundation, Inc. and Town Energy Committee invite other community organizations, including the Chamber of Commerce and the B.I. Residents Association, to join it in constituting a task force to develop a definite proposal on these issues. At least after alternative generation sources such as at the landfill, the sewer plant, and a windfarm are developed, a more concrete proposal can be made to the Power Company.

Legal and Regulatory Matters: An analysis of legal and regulatory matters--local, state and federal, as attached hereto (Appendix B)-- finds that the laws would generally favor the alternative energy strategies discussed in this report. A general overview of relevant law follows, with further appendices attatched discussing particular matters. A major emphasis is on environmental laws because both positive and negative aspects of alternative energy production can have a major impact on the Island's ecology and character.

# APPENDIX A

| | Electricity | Heating Oil | Propane | Wood* | Coal | Gasoline* | Diesel* | Wind | Peat |
|---|---|---|---|---|---|---|---|---|---|
| Amount used on BI | 3,619,656 kwh | #2 302,542gal #1 23,306gal | 7351 Tank | 100 cords | 84 tons | 343,887gal | 539,463gal | 160,945kwt | zero |
| | 10/80-10/81 | 1980 | 1980 | 1980 | 12/80-11/81 | | | 1-9/1981 | |
| Btu per Unit | 1 kwh = 3414.43Btu | #2 1 gal = 139,400Btu | 1 gal = 91,500Btu | 1,900-Btu/lb. | Antricite/ 12,700Btu/ lb. | 1 gal = 110,250Btu | 1 gal = 140,000Btu | 1 kwh = 3414.43Btu | 5,40 9,50 Btu/ |

Ash

Town Facilities FY 1980

| | Doctor's Office | Library | Old Harbor Dock | Town Hall | Sewer Fac* |
|---|---|---|---|---|---|
| Heating | 3546 gals | 1,020 gal | | 1,170 gal | |
| Electricity | 7588kwh | 11,133kwh | 24,400kwh | 5,252kwh | Pump Stat 15,555 kwh Sewer Plnt 47,640 kwh |
| Diesel | | | | | 40,000 gal |

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*****************************
* Equivalents* -Btus
*
* 1 Ton Coal=182 gals #2 oi
*      =7430 kwh
* 1 cord wood=1 ton peat
*
*
*
*
* 1 gal propane=1.20 gal ga
*      =1.52gal#2
*
*****************************
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*See writteh explanations.

# APPENDIX B

# ANALYSIS OF LAWS AND REGULATIONS ON ENERGY DEVELOPMENT

This appendix analyzes the laws and regulations which apply to energy development on Block Island and suggests their applicability to options in the overall report.

## LOCAL LAW

The local law in Block Island consists of the ordinances and regulations of the Town of New Shoreham through its Town Council, Planning Board, Zoning Board and other entities. There is a long-term sensitivity to environmental issues in the existing laws of the Island.

Block Island has an unusual history in that the First Warden had executive, legislative and judisical powers; this has been somewhat ameliorated since the First Warden and Second Warden now serve primarily to preside the Town Council and administer the laws adopted. The Town still has the Town Council acting as a probate court, but only in non-contested cases.

The most important laws for energy development on Block Island are the Zoning and Planning laws. These are administered by the Zoning Board and Planning Board respectively. The Planning Board adopts a comprehensive general plan and also approves specific subdivisions. The Zoning Board approves particular uses of property and grants special exceptions and determines particular hardships from the applications of the Zoning laws. Presently the zoning laws on the Island recognize three basic areas. The

commercial zone is the East section of the Island at Old Harbor (known as the Town) and the New Harbor area near the three large marinas: Payne's Dock, Block Island Boat Basin and Champlin's Marina. The second zoning area is an intermediate residential mixed commercial area which allows one-acre zoning and surrounds the commercial zone on the East side of the Island. The final area is of a basically residential open space character where there is two-acre zoning. Alterations on existing zoning laws would relate to the imposition of cluster zoning, although only one cluster zone development, Trim's Ridge, has been approved on the Island at this time.

Whatever zoning laws would apply to energy development may determine its characteristics. For instance, present zoning laws allow a special exception, i.e. approval within known guidelines of towers for wind turbines. Thus, zones in which such towers were to be allowed were changed than the viability of individual wind turbines versus those owned by the power company or by a wind farm would change. Similarly, if peat digging, which is presently an agricultural pursuit in all zones were to be disallowed in certain zones, this would preclude the development of the peat resource. It should be noted that the Town has specifically authorized a testing of peat by Block Island Economic Development Foundation. (Resolution in Appendix I)

The Planning Board is considering various changes in the existing zoning laws and subdivision regulations which will further impinge upon various kinds of development on the Island. Among the things which the Board has considered are impact on hydrology (water use) and undergrounding of utility lines. There is a clear relationship between energy use and water use on Block Island, not

only because electricity is used substantially for water pumping, but also because a major energy use is water heating. Thus any action by the Planning Board in regard to water will affect energy use. There is a controversy regarding the Planning Board's requirement of undergrounding of utility lines, because of the objection by the utility company of interference with its prerogatives and because it does cost more initially. There is a difference of opinion as to whether in the long run it would be cheaper to place cables underground thus avoiding maintenance problems with the existing overhead cables because of the high winds in winter. There is a related problem as to the telephone and cable television lines which presently exist on the Island, and whether if they are undergrounded their maintenance cost will be less or more than it presently is.

There is a specific Town ordinance, separate from the zoning laws, which gives authority to the Conservation Commission of the Town to look at open spaces and wetlands. In the instance of peat use, the Conservation Commission has made a specific finding to favor the testing of peat on Block Island. This resolution is attached. One interesting difference between the Conservation Commission's viewpoint and that of the Department of Environmental Management is that the town agency claims jurisdiction over all wetlands no matter how small. No view is expressed as to any possible State preemption of local law. The major force of the Conservation Commission is a moral one in any case, which causes the Town Council to consider the problems of conservation in adopting its policies.

A final area of local law relates to future ordinances by the Town. One result of the research in this project is the consideration of a source separation for garbage, which would reduce garbage processing costs as well as conserve energy. Whether or note the State adopts a "bottle bill" as seems likely, the Island may want to have its own form of required source separation. Among the suggestions which have been made is to not allow any private dumping at the Town Landfill, but to have Town refuse collection with source separation, to have a reward for bottles and cans (which could include young children on the Island gathering bottles and cans and providing some money, particularly in the off-season) and the more specific imposition of either voluntary or mandatory standards on glass, aluminum, metal, animal and vegetable wastes, newspapers and other papergoods. A few sample regulations and ordinances of other municipalities are attached to this report and it is recommended that such regulations be adopted.

There has been very little consideration on the Island of recreational opportunities for the year-round residents. One form of resource recovery, which the University of Rhode Island has pioneered in is the use of tires to improve the resilience of sand dunes and beaches. Combining the use of tires with sand dune and beach protection would improve the recreational opportunities on the Island. Specific examples of this could be at Dorry's Cove and the beach west of the Town Landfill. It may be possible to improve the quality of both beaches through putting a

tire interlacing out into the water which would cause sand to collect on the actual beach. This would interrelate at the Landfill with the possible creation of a park behind the existing sand dunes. To the North of the park could be a new refuse processing facility which would include units for incinerator power production and source separation. There would have to be some investment of Town funds, on a long-term capitalized basis. But most of the cost could be borne through an independent bonding mechanism such as that provided by the Rhode Island Solid Waste Management Corporation or the Rhode Island Port Authority and Economic Development Administration. Town ordinances would have to be adopted to specifically provide for such an option.

STATE LAW

One major conclusion of the study done for this report is that State law may very well be the most important determinant in the particular projects which are able to go forward in Rhode Island. This comes about because of two converging trends. One is the federal reduction in general funding and loan authority. The other is federal deregulation and emphasis on state implementation of any existing federal programs. Thus state law becomes extremely important in determining what becomes viable on Block Island. Among the state laws which do apply are those which deal with the coastal management, financing, taxation and zoning.

For energy development on Block Island probably the most important set of laws may be environmental. As part of the project here involved, an analysis of the environmental impact of digging peat on Block Island was done and preliminary applications were prepared

to make a test dig of peat on Block Island. Four particular sites were selected out of over thirty which could have been considered. These sites were chosen because of accessibility, ownership and least environmental impact. The Department of Environmental Management is not a unitary animal and has been very helpful in creating the report while at the same time being very stubborn in requiring every jot and tittle of its regulations to be complied with. It is the position of this report's authors that DEM's interpretation of the Wetlands Law is incorrect in that it treats what is an environmental test and a planned benign digging of a wetland, like it would a filling in of a wetland. This is very disappointing in that it was hoped that there would be some sensitivity to the distinction in choices. In direct contrast, DEM has allowed a preliminary determination to fill in New Meadow Hill Swamp, a known peat resource behind Block Island Power Company, in order to allow erection of the Power Company's new headquarters/residence. At this time, after much additional work, a formal permit to dig in Red Gate Marsh has been filed.

The environmental laws which do apply relate to air quality, water quality, noise and wetlands. Air quality would likely be improved under any of the options suggested in this report, although there would have to be a careful analysis of the benefits from the incinerator proposal for use of garbage and peat compared to the existing emissions from the diesel generators at the Block Island Power Company. While Block Island presently has a great deal of a "bubble" under existing State and Federal regulations,

people on the Island may be want to have more strigent requirements than the state would have. It would therefore be helpful to have more accurate monitoring of the existing emissions.

Water quality is not a problem on Block Island, except at the Marinas. It seems unlikely that there would be any impact whatsoever on water quality, except for short-term turbidity caused by digging peat in particular peat bogs. An important issue, however, is of a long-term viability of the Block Island water table. This should be studied.

Noise pollution is a problem on Block Island, and in part has an energy base. The existing power plant does cause noise and wind turbines may have a swishing sound. However, there has been no objection to the three operating wind turbines on the Island. The objections which exist go to the rate impact of these turbines, not their noise. Similarly the existing sewer plant was evaluated for noise when it was designed, and it has sufficient noise suppression which would not be interfered with by proposed energy projects.

FEDERAL LAWS

An environmental assessment is attached (Appendix C) which discusses in detail the federal environmental considerations for projects which could be based at the sewer plant, town landfill or existing power company site using, sewage, garbage, seaweed and/or peat. The net analysis is that such projects would provide an environmental gain for the Island.

Also attached are briefs filed by the Town of New Shoreham and the Division of Public Utilities before the Rhode Island Public Utilities Commission (Appendix F). These briefs discuss the favorable climate created for alternative energy on Block Island caused by federal regulatory law.

# APPENDIX C

# I. AN ENVIRONMENTAL/LEGAL ANALYSIS BASED UPON ENERGY DEVELOPMENT OF GARBAGE, PEAT AND OTHER BIOMASS

## A. Rank Listing of Beneficial Environmental, Health, Safety, and Socio-Economic Impacts from this Proposal

1. Creation of a substantial number of jobs for year-round Block Island residents.
2. Reduction in energy costs for both year-round and summer residents of Block Island.
3. Reduction in adverse environmental impacts from present diesel generation of electricity on Block Island.
4. Increase in the amount of open water available for migratory water fowl on Block Island.
5. Reduction in energy use and environmental impact on transportation of imported petroleum to Block Island.
6. Reduction of iron and manganese in Block Island ground water.
7. Reduction in unnecessary use of the limited supply of land for solid waste disposal on Block Island.
8. Production of valuable aquatic plants and shell fish using waste hot water from energy processes.

## B. Rank Listing of Major Environmental, Health, Safety, and Economic Risks

1. Possible loss of habitat for certain marsh-dwelling water fowl.
2. Loss of habitat for certain marsh plants.

## C. Conclusion of Significance of Particular EHSS Impacts

Since the expected EHSS impacts are positive, except for a nominal impact on certain wild fowl and plant life which will have a substantial amount of other habitat, it is predicted that the proposal would have the positive impacts of increased employment, improved lifestyle, improved aesthetic enjoyment and more open-water migratory birds on Block Island. To the extent that there would be loss of certain marsh dwelling wild fowl and plants, there would be an effort to encourage additional propagation of these species. Block Island has two quite large wild-life refuges which would not be disturbed in the development of the Island's peat resources. The peat resources which we intend to develop are located in areas which are already disturbed and/or have been historically used for the harvesting of peat. The use of garbage and sewage sludge as proposed would, under all circumstances, have a positive impact.

## D. Anticipated Impact of Changes or Additions to Applicable Environmental and Occupational Regulations

No changes or additions to applicable environmental and occupational regulations are expected regarding this proposal.

The only possible problem anticipated with the positive environmental impacts of this proposal is that it may not be feasible to encourage all forms of wild life which have previously resided in marshy type environments when they are reclaimed as open water. Thus, it became a judgment that the open water life forms and the other positive environmental impacts clearly outweigh the possible loss of some other life forms in the area of peat harvesting.

E. Unresolved EHSS Issues

There are no unresolved EHSS issues in unquantified effluents or emissions which would affect the validity of the EHSS impact analysis at this time, except for a possible analysis of endangered species. The Block Island Economic Development foundation has consulted with a responsible official within the Audubon Society, who considered this proposal. On balance no known adverse impact, except for possible endangered species should be done in the event that this proposal is approved by the Department of Energy. Such an analysis is provided for in the Bureau of Mines Study. In addition it is intended that a full-time biologist with knowledge of the Island's ecology will be hired for the project and will seek habitants for valuable plant and animal species.

## II. EXISTING SITE CHARACTERISTICS

A. Description of Sites

1. The primary site proposed is the existing site of the Block Island Power Company, which in addition to having a number of industrial-type buildings has a large windmill 200 (kw) which has been placed at the site by the Department of Energy. A Final Environmental Impact Statement regarding this windmill has previously been prepared. In addition, the site has substantial peat bogs which would be used for the production of energy on site. Other possible sites for part of the project include the present landfill operations and sewer plant operations.

B. Description of Existing Drainage and Runoff Patterns For Plant Site and Fuel Storage Areas

1. No change is expected in existing drainage and runoff patterns for plant site and fuel storage areas. All peat removed will be dried on site and therefore any runoff will flow back into the lowlands of the peat bogs.

C. Description of Existing Off Site Facilities

1. The transmission lines which exist on Block Island are on typical rural wood posts with single lines. These lines carry moderate voltage electrical current, and telephone and a cable television signal.
2. Transportation Access - The present access to Block Island is by air in single engine or two-engine planes or by ferry provided by Interstate Navigation Company. Heavy equipment may be brought in by barge although this is probably unnecessary for the type of equipment which is expected to be used. No increased transportation activity is expected, but an improved load factor on existing facilities should occur.
3. Water Source - Since Block Island is an island, there is no shortage of salt water. In addition there is a substantial amount of fresh water available for any project needs. To the extent that additional water is needed for gasification cooling this can be provided from the larger open ponds created by digging for peat on site.

D. Description of Environmental Settings Attached To This Proposal

A copy of a study done for the Governor's Energy Office of Rhode Island, regarding the peat potential on Block Island.

Further study will be done for a Bureau of Mines study of environmental and economic impact. Practical feasibility has been demonstrated by a small grant for renewable resource study which was funded by DOE.

The topography of Block Island has been extensively studied by various Federal agencies and there are extant topographic maps which show all relevant features. Relevant maps are attached to this proposal. Further impacts are discussed below.

1. Atmospheric Conditions

Block Island is in the northeastern United States, specifically New England. However, since it is a coastal region, it is not subject to the same type of ambient air quality problems that the mainland has. It is a non-degradation area, and it is expected that the use of gasified peat and waste should reduce the amount of discharge into the air. The present diesel generation supplies substantial amounts of sulphur, carbon monoxide and nitrous oxide. Burning of peat in stoves and furnaces should provide improved air quality since it would substitute for the use of number two heating oil which has far greater amounts of sulphur and other pollutants. Downwind from Block Island is the Atlantic Ocean. There would be no impact on the mainland.

2. Hydrologic conditions

Block Island does not have flowing streams. It has many ponds and wetlands. These are fully identified in the attached study done for the Governor's Energy Office. There should be no impact on surface and ground water since the only water flow will be from the drying of peat which will be done on its original site. The impact on aquatic habitats is both positive and negative in that some water fowl landings should be encouraged by increased open water caused by the removal of subsurface peat and vegetation while other water fowl will be discouraged by such a change. There should be no hydrologic hazard from flood or storm runoff since the ponds or bogs will have greater depth.

3. Geologic Conditions

Block Island is a glacial island which has been fully described in various studies including some attached to this proposal. There should be no difficulty regarding soil productivity from this proposal. There is very little present agriculture on the Island except for individual gardens. These will not be impacted.

4. Ecological Conditions Regarding Endangered Species

Block Island is a unique ecological system. The present use of imported petroleum has had a negative impact on this system. The use of peat, garbage and sewage sludge should have a positive impact on its overall ecology. The only unknown factors are regarding endangered species. There is a great profusion of wildlife and vegetation on Block Island, some of which are little found on the mainland. However, this proposal does not intend to greatly impact more than four of the hundreds of wetlands on the Island. As indicated previously, a full-time biologist will be employed to monitor species populations.

5. Socio-Economic Conditions

Block Island has an estimated population of 500 persons on a year-round basis with an estimated summer population of 3,000. It has been losing year-round population, particularly among young people, because there is no employment. It is expected that this proposal will both provide direct employment and indirect employment by improving the economic conditions on the Island. Because the year-round islanders have the lowest per capita income in Rhode Island, available public services have been limited. To the extent that the economic conditions improve because of this proposal, public services should also improve.

6. Aesthetic Conditions

Block Island is a very beautiful natural island which attracts many visitors. The proposal should improve its aesthetic conditions by reducing the odor and particulant coming from the present power plant. There

would be no impact on historical or ecological sites from the proposal and cultural values should be enhanced from the use of indigenous resources. It is intended to improve the power plant site by including landscaping in this proposal.

7. Tribal or Other Religious Practices are Not Impacted Near the Proposed or Alternative Sites

The sewer plant happens to be near the Harbor Baptist Church where meetings regarding the peat project have been held. Rev. Anthony Pappas, Pastor of the Harbor Church is a member of BIED Board of Directors and supports this proposal. There is no known objection of any religious group to the proposal and the other proposed locations are not near religious sites.

8. Identification of Any Other Major Energy or Chemical Complexes

There are no major energy or chemical complexes on Block Island. The closest to an energy complex that exists is the existing power plant site which the primary project is expected to use in improved form.

## III. PLANT/PROCESS DESCRIPTION

### A. Plant Resource Requirements

The energy form to be used in the project is peat dug from bogs on Block Island, garbage from people living on the Island and sewage sludge from the existing sewer plant on the Island. Employment is expected to be solely of persons living on the Island for operational necessities.

### B. Plant Site Plan and Topographic Maps

1. The site involved is the current power plant site which is approximately 19 acres with steel buildings, power plant office/residence and the DOE windmill. Most of the New Meadow Swamp, which is detailed in the Governor's Energy Dept. survey as a major peat resource is on this site. A second site is the town landfill (which is open land next to sand dunes and Block Island Sound) which has been approved by the Environmental Protection Agency as a landfill. Third is the town sewer plant site which has been both approved and substantially paid for by the EPA. (Land either presently owned by the Town of New Shoreham or adjacent private land is proposed to be used.)
2. Fuel Storage Area. There will be storage of peat until it dries next to existing bogs. Further storage may be in a new building either at the town landfill or at the power plant site next to other similar buildings.

### C. Off-Site Facility Requirements

1. Electric transmission lines. No additional electric transmission lines will be required under this proposal

except for an extension of additional service to the town landfill.

2. Transportation access. Existing air and ferry transportation will be used for material. Dump trucks will be used for transportation with the expectation of use of indigenous fuel for such dump trucks at a future point.

3. Water Intake and Discharge. It is expected that some additional amounts of water will be needed for cooling of the gasifier. The discharge from this water may be used for heating a greenhouse for the growth of vegetables in the winter, peat drying, the hydroponic growth of vegetables, and the promotion of shellfish farming.

4. Product Storage will be in piles of drying peat, compacted peat, and garbage or sludge in the form of extruded briquettes (in bags) in buildings.

D. In-Plant and Over-The-Fence Discharges During Construction, Operation and Maintenance of Plant

1. Quantity, physical and chemical restrictions

a. Air emissions

Fewer emissions than presently occur from diesel generation are expected from the use of peat, garbage or sewage sludge. However, there may be additional particulate emissions from individual residences which will use peat in place of other energy forms. Overall emissions should be reduced in the substitution of peat for number two heating oil.

b. Liquid Effluence

The only liquid effluents anticipated are thermal discharges from the plant which are to be used for agriculture and shellfish production.

c. Solid Waste

The only anticipated solid waste is a minor amount of inert ash which will be added to a much diminished town landfill.

d. Other Discharges

There should be less heat, noise and odor than presently exist from the power plant.

2. Identification of Standards for Discharges

Block Island is a present non-degradation area with existing discharges from the power plant in its diesel generation. There are also discharges from the existing sewer plant when it operates using diesel fuel. Further, there is burning at the present town landfill. All of these effects should be limited or eliminated through the proposal. The low BTU gas being produced will leave little or no emission when combusted.

3. Description of Mitigating Measures Employed in The System

Since the plant itself will have a positive environmental impact, there is no need for mitigating measures.

It is intended that thermal wastes will be processed in a useful manner through agriculture or aquaculture.

4. Consequences of Project

a. Consequences of Construction

1) Overall Description of Construction Activities

Since the only anticipated construction for this project is the putting in place of gasification equipment in existing buildings and the replacement of some of the existing diesel generators, (with the possible construction of one building for storage of peat) there will be little disruption from construction. What disruption that does occur will be on the disturbed sites where the power plant presently exists, where the sewer plant presently exists and where the town landfill presently exists.

2) Environmental, Health and Safety Impacts

i. No atmospheric impact from construction itself is anticipated.

ii. There will be no anticipated hydrologic impact from construction itself except from nominal rain runoff on direct construction work. This is anticipated to be very minimal.

iii. Plant Use Impact

There will be no plant use impact from construction since already disturbed sites are expected to be used.

iv. Public and Occupational Health Consequences

The type of construction anticipated is a very low risk. All normal safety precautions will be employed. The introduction of new equipment should improve safety and working conditions for present power plant employees.

## IV. ECOLOGICAL COMMUNITY DISTURBANCES

Construction should not cause any ecological community disturbances since it will be done on existing construction sites.

1. Community Impacts on Construction Labor Force

It is anticipated that persons presently living on Block Island will comprise the construction labor force. The labor force to be employed should have all construction skills except for certain engineering consulting services as needed.

2. Increased Demand for Local Services

There should be no increased demand for local services of any consequence because of the construction except to the extent that the increased income of Island residences will increase spending on the Island. This should not cause additional tax expense, however, and should increase revenue.

3. Increased Demand for Housing

There should be no increased demand for housing from the construction except to the extent that Island persons with greater income may upgrade their existing housing. This is a positive impact.

4. Community Economic Benefits Attributed to Payroll or Tax Benefits

As indicated previously, it is expected that the employment from construction can be accomplished in the Fall through Spring period and thus improve the economy load factor which is otherwise heavily dependent on summer tourism.

## IV.2 CONSEQUENCES OF OPERATION

A. Environmental, Safety and Health Impacts as a Result of Project Operation

1. Atmospheric Impacts

The possible emissions from the operation of the project will, under the four classifications noted, be less than that from existing diesel operations. The precise amounts of emissions are not known. However, peat, when it is directly burned, ordinarily has one-tenth the sulphur content of other fossil fuels. It would have approximately the same impact as wood. However, because it would be a dispersed site impact with the high wind velocity over the open ocean of Block Island, it would not, under any known circumstances, stay and accumulate over land areas. Most emissions, if any, would come from the combustion of the low BTU fuel which will be produced in the gasification of peat, solid waste and sewage sludge. These emissions (expected to be small amounts of CO and $CH_4$) will be produced at a high efficiency level. They will be of small amount in relationship to the existing diesel generation from inefficient machines. The existing power plant produces electricity at 23% efficiency factor, and from observations appears to produce significant quantities of $SO_2$ and $H_2S$. The existing plant probably produces significant CO and other emissions which should be determined in the Bureau of Mines study.

2. Hydrological Impacts

There would be no adverse hydrologic impacts from the operation of this project. Disturbances of water bodies will only occur in the actual peat bogs and, in this instance, drying will take place on site. Therefore, water will either evaporate or run back into lower lying bog areas. The use of waste heat in the form of hot water should have a positive environmental impact in its use in agriculture and aquaculture.

3. Solid Waste Impacts

The project should have a positive impact on waste disposal on Block Island, since it is intended that that volume presently being either buried or burned will be substantially reduced in the gasification process and the only end product will be a small amount of inert ash as a waste product after separation of inert metal and glass.

4. Geologic Imports

The only geologic impact presently forecast is the reclamation of peat bogs. There is an issue regarding open water versus vegetated marshes. Some forms of plant and animal life prefer one rather than another and the balance between the different forms may be affected by the peat digging. There may also be some short diversion of water, although there would be no diversion of any consequence for the entire island. Concentrations of iron and manganese should be reduced in ground water since removal of peat will reduce run-off of these elements.

5. Public and Occupational Health and Safety Impacts

There should be improved public health and safety from this proposal. There will be less exposure to petroleum products and less odor from diesel generation with the present smell of sulphur. There will also be fewer breeding ground for mosquitos and other pest insects.

6. Ecological Impacts

As indicated before, there are both positive and negative impacts of the peat digging operations. In any instance they would not be substantial in relationship to the entire island. Since hunting is very greatly restricted on Block Island there should be a positive impact on the recreational use of Block Island in that the aesthetic detriment from the burning of diesel fuel will be eliminated. Bird watching (a substantial pursuit on the island) should be improved. Further, revegetation should occur naturally. To the extent that a study of endangered species finds that there would be encouragement of certain kinds of vegetation, this will be included as part of the proposal. Also, it is expected that sport shellfishing will be improved to the extent that certain forms of shellfish may be intentionally grown using thermal discharges from the project.

7. Impact on Local Plans

The proposal has the support of local public officials including the Planning Board and the Chamber of Commerce since it should have a positive impact on land use and employment on Block Island.

8. Irretrievable Commitment of Resources

The only irreversible impact on resources may be a short-term one of the peat use itself. Peat is a semi-renewable resource, since there can be regrowth

of the peat bog within one century. However, to the extent that this is a long-term impact, other possible uses of peat may be limited.

B. Socio-Economic Impacts

1. Community Impacts

It is anticipated that this proposal will allow existint Island populations to remain year-round, rather than having to pursue other employment opportunities because of the present seasonal nature of the Block Island economy. This should improve the cash flow for all Island businesses and should increase the taxable incidents for the Town of New Shoreham. Income per capita on Block Island is presently the lowest in Rhode Island. The current population is 500 year-round persons, although this can swell to as many as 3,000 during the summer. It is expected that income per capita should improve with this project. Real spendable income should improve even more since it is anticipated that the cost of energy will increase at a rate lower than the rate of inflation if this project is implemented.

2. Aesthetic Impacts

There should be a positive aesthetic impact from this proposal, since there will not be the odor from the burning of diesel fuel and the smoke which presently occurs. In addition, because the proportion of open water to vegetated marsh should change, there should be a decrease in the amount of insect pests being bred on the Island and an increase in migratory water fowl.

3. There should be no impact on religious practices and sites from this proposal. Any change in community character would be a positive impact and a movement back to the former character of Block Island as a year-round community.

V. EXTRACTION/PREPARATION/TRANSPORTATION OF RAW FUEL FEEDSTOCK

A. Peat Extraction

Raw fuel (peat) will be extracted by draining bogs, if necessary (most are now dry), and surface-digging the peat, utilizing existing small construction equipment (backhoe, crane, payloader). Peat will be field-dried on the site for a period of two weeks or until moisture content is down to forty percent. Material will then be transported to central site (power plant), using local dump trucks. At this point peat will be mixed with shredded solid waste to a moisture content of 30/32% and compacted to pellet form at 1.2 atmospheres, and placed in storage sheds.

B. Resource Requirements

1. Energy (gasoline or diesel fuel) enough to run two pieces of small construction equipment for seven months would be needed. Approximately 3,000 gallons of fuel would be used for transportation. Shredding, mixing and compacting equipment would be electric, using excess or off-peak power at power plant site, amount unknown.

2. Water Use and Consumption
No water will be used at this point. Run-off would return to source.

3. Land and Productivity
At this time some bogs have been donated; negotiations have begun to acquire others. The legal department will work on these matters. It is expected that the bogs and surrounding lands will be returned to their original condition as ponds and meadows.

4. Waste Disposal Sites
By using solid waste in the process, we expect to prolong the life of our present landfill by twenty to thirty years. There will be no waste from peat extraction.

5. Manpower
Eight to ten workers will be employed in the extraction, preparation and transportation phase which will occur during the seven winter months, when unemployment figures on the Island are at their peak. It is our plan to use local fishermen who are idle during these months. Another eight to ten full-time employees will handle waste collection, separation, shredding, mixing, cubing and storing. We expect total employment during this operation to be sixteen to twenty.

6. Transportation Needs
Transportation will be sub-contracted to local existing companies.

C. Environmental Discharges

1. Since initial drying of the peat will be done at site of extraction, water will simply return to source. By removing peat from ponds, most iron and manganese will be removed from the ground water.

2. A presently ongoing environmental impact will identify any endangered species. An employed full-time biologist will continuously monitor all work. At this point it is felt that by opening these overgrown bogs we can effectively maintain an organic mosquito control program, and hopefully entice the migratory water fowl back to the Island.

3. Air emissions - only normal exhaust emissions from standard small construction equipment and over-the-road trucking. Liquid effluents-water run-off from the initial extraction-will return to the original source. Solid waste-because of our use of solid waste as a source of raw material, the local land-fill operation will be greatly reduced. Other discharges-only normal noise and odor from small construction and over-the-road trucking. Shredding, compressing and cubing equipment will be enclosed and will comply with OSHA standards.

B. EHSS Impacts

1. Ecological Community Disruptions

In that the extraction will take place during off-season, the visual impact will be minimal. By digging and deepening the ponds, most of which are now dry, we will return them to their original condition.

a. Incidental by-products of operation.

1) A large percentage of iron and manganese will be removed from ground water.
2) Migratory water fowl will return.
3) Local fire protection, which normally uses available ponds, will be enhanced.
4) Recreation will be increased by greater availability of ponds for fishing and swimming.
5) Land values will increase because of enhancements of visual beauty and non-chemical pest control.

2. Public and Occupational Hazards

We will comply with OSHA standards.

3. Socio-economic Impact

The immediate impact is the creation of sixteen to twenty new jobs. It is also hoped that with the implementation of cheaper energy, an ice plant can be built, thus enticing a larger fishing industry.

4. Geological Modifications to Terrain

Because the bogs will become ponds--open and deeper--a better habitat will be afforded to water fowl and marine life. The holding capacity of deeper ponds, before normal spill-off, will greatly inhibit evaporation so as to maintain a constant fresh water habitat. Because of the extremely dry summer, most bogs and ponds on the Island are now dry.

5. Reclamation

All facilities used in the extraction and drying process (i.e. roads, scraped areas, etc.) will be returned to their original condition. This will include planting of local shrubs and grasses. Ponds will be stocked with appropriate aquatic life.

## IV. COLLECTION/DISTRIBUTION/USE OF ALTERNATE FUELS

A. Identification (other)

The peat, together with the selected solid waste, will be processed through a bio-mass processing and collection system. Produced in the system is a low BTU synthetic fuel which will be used to power electric generators. Electricity will be transmitted over existing transmission lines to the consumer.

B. Characterization of Products

1. Not identified in TSCA (peat, solid waste, ash).
2. Not identified in TSCA priority list.
3. Not on OSHA exposure list.
4. Not in RIOSH registry.
5. Not identified in OSHA cancer policy.
6. No known potential health effects.

C. Description of Collection and Distribution Systems

Collection of alternate fuel (low BTU syntha-gas) will be through a closed system bio-mass gasification system, with a short direct feed to diesel generating equipment. Electrical energy will pass through existing transmission lines.

D. Description of Impacts

There will be no short- or long-term impacts other than socio-economic, i.e. reduction in cost to consumer.

## VII. REGULATORY COMPLIANCE

The full detail of regulatory compliance should be developed in the course of the Bureau of Mines financed Study of Environmental and Economic Impact which will be completed in the earlier part of this project time scale. It is anticipated that the environmental and economic study will be completed in May 1981. All permits should be granted by December 1981.

What follows is a preliminary evaluation of the law and regulations which may apply to this proposal.

A. Applicability of Current Proposed and Anticipated Regulations

1. Clean Air Act - National Ambient Air Quality Standards (NAAQS)

It is anticipated that the concentrations for TSP (total suspended particles in air), HC, CO, $SO_2$, Pb, photochemical oxidants and $No_x$ will be produced under any circumstances. The production of HCCO, $SO_2$, and photochemical

oxidants will be reduced. Specific numbers should be provided by the Bureau of Mines Study.

a. Prevention of Significant Deterioration (PSD) (Attainment areas)

There should be one-tenth of the current emissions of $SO_2$ from this proposal than in the existing diesel generation and use of number two heating oil in homes. There should be no TSP emissions. CO should be nominal as should hydrocarbons and ozone. There should be no lead emissions. To the peat-derived diesel fuel for transportation, the existing lead concentrations from gasoline use may also be reduced.

b. Non-Attainment

Non-Attainment standards do not appear to apply.

c. New Source Performance Standards (NSPS)

It is anticipated that there will be no difficulty in complying with NSPS standards when such are developed for the particular processes that are proposed. The figures should again be developed by the Bureau of Mines Study.

d. National Emission Standards for Hazardous Air Pollutants (NESAPS)

There are no expected emissions of asbestos, beryllium, mercury, vinyl chloride, benzine, VOC, or any other known carcinogens from this proposal. Again, this will be studied in the Bureau of Mines impact research.

e. Visibility

To the extent that class one, pristine area designation applies to Block Island, there should be no difficulty in compliance with such regulations since the gasification process and combustion should reduce substantially the amounts of particulants presently being discharged on Block Island.

2. Clean Water Act

There should be no problem of compliance with the National Pollution Discharge Elimination System (NPDES), for this proposal. There has been previous consultation with the Department of Environmental Management for Rhode Island regarding the peat proposal. There will be no problem regarding the initial digging on one site and there should be no problem with the future. This will be studied, however, in the Bureau of Mines Study.

3. Safe Drinking Water Act
There should be no impact on the underground injection control (UEC) from this proposal, since it is not anticipated that discharge will go into ground waters on Block Island. The only substantial discharge will be of heated water.

4. Resource, Conservation and Recovery Act (RCRA)
It is not anticipated that the RCRA will apply to this proposal since it is not anticipated that any solid and hazardous waste will be produced by this project. The solid waste recovery will have positive impact. Block Island presently has no industrial waste although there is a substantial volume of restaurant and residential garbage and trash production. It is anticipated that this trash and garbage, as well as sludge, will be used in the project.

5. Toxic Substance Control Act (TSCA)
This impact will be studied under the Bureau of Mines Study. It is not anticipated, however, that any toxic substances would be involved in this proposal.

6. Surface Mining Control and Reclamation Act (SMCRA)
It is not expected that the SMCRA will apply to this proposal. But it is anticipated that the Department of Interior, Bureau of Mines, will indicate whether its enforcement of SMCRA applies in the study it is financing.

7. Occupational Safety and Health Act (OSHA)
OSHA will apply to this proposal, but no problem of compliance is anticipated. There should be no toxic noise or dust from the proposal, although the gasification process must have appropriate venting for elimination of CO. This will be implemented. The safety and work environment should be improved by the introduction of new equipment and landscaping.

a. Preliminary Description of Dust Control Technology
Since it is anticipated that there will be no need for control technology other than normal safety precautions in operating this project, there should be no problem of control. However, there will be monitoring of any fugitive CO which may occur.

b. Preliminary Assessment of Environmental Monitoring Requirements
As indicated, there will be monitoring for any emissions although this is not expected to be a difficult problem.

c. Filing for Major Permits
There will be no need for major permits in the proposed phase one of this project which will be the design and permit application stage including the initial digging and compacting of peat from a test bog and development of usage plans for resource recovery. Shortly thereafter all major permits will be applied for and a preliminary environmental impact statement will be created. It is hoped that the Department of Environmental Management will hire a parttime biologist on the Island who will participate in any further planning, monitoring, and implementation.

# APPENDIX D

# AN ANALYSIS OF

# REGIONAL SOLID WASTE MANAGEMENT ALTERNATIVES

# FOR MARTHA'S VINEYARD

Directive of Work No. 10
Contract No. 68-01-4940

Prepared for:

U.S. ENVIRONMENTAL PROTECTION AGENCY
Region I
John F. Kennedy Building
Boston, Massachusetts 02203

Prepared by:

GORDIAN ASSOCIATES INCORPORATED
1919 Pennsylvania Avenue, N.W.
Suite 405
Washington, D.C. 20006
(202) 828-7300

October 10, 1979

Procedure for Analysis of Recycling Feasibility.

Gordian was to define the steps which island officials should pursue to analyze the possibility of, and if feasible, the implementation of, a recycling program.

In order to present the analysis results more clearly, this report has been organized along slightly different lines, although the four main tasks are still thoroughly addressed. Gordian's basic approach to this project was to gather as much data as possible from on-island sources through a brief site visit followed by telephone interviews, and then to supplement this information with data from existing sources such as EPA publications and previous studies of communities with similar problems. It was understood and agreed to by EPA, the BSWD, the Martha's Vineyard Commission, and the Island-Wide Solid Waste Disposal Sub-Committee that Gordian's effort was not to include the development of detailed local data since that would necessitate a much more lengthy and costly level of involvement. Consequently, much of the analysis presented in this study is based on assumptions and estimates which Gordian feels are reasonably accurate, but they should not be construed as definitive values without further on-site investigation. Summaries and results of the analyses are presented in the main body of this report. The underlying assumptions and background calculations are displayed in full in the appendices.

The systems developed here are intended to be conceptual designs and should not be considered implementation plans, as they are not necessarily the best or only solutions to the solid waste problems confronting Martha's Vineyard. Rather, the purpose of this study is to provide a comparative evaluation of several solid waste management options which are capable of satisfying the island's needs, while complying with state and federal statutes. This information is intended to enable the relevant decision-makers to make a more informed choice as to which system is best suited for the citizens of Martha's Vineyard.

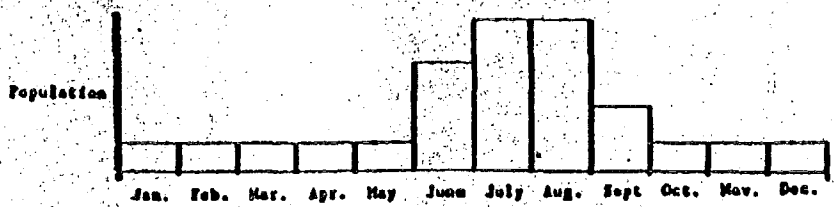
## WASTE QUANTITY AND COMPOSITION

The solid waste problem on Martha's Vineyard is aggravated by the fact that the size of the waste stream fluctuates dramatically from winter to summer (see Appendix A). This obviously reflects the huge influx of "summer people" from June through September. Determining the size and distribution of this influx is the most important element in deriving an accurate estimate of the nature of the waste stream. Since there are currently no direct measurements of the size of the island's waste stream, Gordian's estimates are based upon applying a reasonable per capita waste generation rate to estimates of the population. The population estimates used in this study were provided primarily by the Martha's Vineyard Commission. Information gathered during a visit to the island on July 11-12, 1979 indicated that the summer influx was spread over four summer months (June - September), with greatest concentration in July and August. Gordian approximated this monthly distribution as shown in Table 1. This population curve can then be applied to per capita waste generation estimates to determine the quantity of the waste stream.

The waste generation rates employed in this study are based primarily upon local information and studies of similar areas, rather than generalized national data. The rates used are shown in Table 2. These rates were then applied to the corresponding population estimates (from Table 1) to determine an estimate of the annual distribution of solid waste on Martha's Vineyard. Table 3 displays the waste stream information resulting from this calculation. Note that the estimates for 1990 and 2000 are based upon population increases while holding waste generation rates constant. This appears to be a reasonable assumption given the uncertain and often conflicting nature of professional opinion on this subject.

TABLE 1.

TABLE 1. MONTHLY POPULATION ESTIMATES FOR MARTHA'S VINEYARD (EXCLUDING DAYTRIPPERS)




| | 1979 | | | | | 1990 | | | | | 2000 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Oct.-May | June | July | August | Sept. | Oct.-May | June | July | August | Sept. | Oct.-May | June | July | August | Sept. |
| Chappaquiddick | 50 | 1,394 | 2,065 | 2,065 | 722 | 75 | 1,611 | 2,380 | 2,380 | 843 | 90 | 1,710 | 2,520 | 2,520 | 900 |
| Chilmark | 455 | 3,939 | 5,680 | 5,680 | 2,197 | 530 | 4,540 | 6,545 | 6,545 | 2,535 | 555 | 4,805 | 6,930 | 6,930 | 2,460 |
| Edgartown* | 2,340 | 8,700 | 11,880 | 11,880 | 5,520 | 2,685 | 10,017 | 13,685 | 13,685 | 6,352 | 2,835 | 10,605 | 14,490 | 14,490 | 6,720 |
| Gay Head | 165 | 1,438 | 2,065 | 2,065 | 798 | 190 | 1,650 | 2,380 | 2,380 | 920 | 200 | 1,746 | 2,520 | 2,520 | 973 |
| Oak Bluffs* | 1,965 | 10,295 | 14,460 | 14,460 | 6,130 | 2,230 | 11,850 | 16,660 | 16,660 | 7,040 | 2,365 | 12,549 | 17,640 | 17,640 | 7,457 |
| Tisbury* | 3,135 | 7,938 | 10,330 | 10,330 | 5,533 | 3,510 | 9,104 | 11,900 | 11,900 | 6,307 | 3,780 | 9,660 | 12,600 | 12,600 | 6,720 |
| W. Tisbury | 745 | 3,691 | 5,165 | 5,165 | 2,218 | 890 | 4,264 | 5,950 | 5,950 | 2,577 | 945 | 4,515 | 6,300 | 6,300 | 2,730 |
| TOTAL | 8,855 | 37,381 | 51,645 | 51,645 | 23,118 | 10,110 | 43,036 | 59,500 | 59,500 | 26,574 | 10,770 | 45,590 | 63,000 | 63,000 | 28,180 |

* These towns also accommodate day-trippers during July and August. In 1979 it is estimated that 4,305 day-trippers per day visited each of these towns. In 1990 the number is 4,960 and in 2000, 5,250.

TABLE 2. ESTIMATED WASTE GENERATION RATES [1/]

| | Summer (June–September) | Winter (October–May) |
|---|---|---|
| Large Towns (Edgartown, Oak Bluffs, Tisbury) | 4 lb/person/day | 2.5 lb/person/day |
| Small Towns (Chappaquiddick, Chilmark, Gay Head, W. Tisbury | 2.5 lb/person/day | 1.83 lb/person/day |
| Day-Trippers (Only during July and August) | 2 lb/person/day | N/A |

1/ Full explanation of how these rates were determined is presented in Appendix A.

## SUMMARY

The objective of this report was to examine several solid waste management alternatives for Martha's Vineyard and present a clear picture of the design and cost parameters of each system. As requested, the emphasis of this study was placed on the analysis of the collection system alternatives and the regional landfill system, based on detailed estimates of the size and distribution of the waste stream. Preliminary evaluations of a modular incineration/energy recovery system, and of a source separation program were also performed. The information developed for these alternatives is supported by the detailed Appendices included with the report.

Although Gordian was instructed to refrain from making specific recommendations, the results of our analysis point to several conclusions:

- In view of current state statutes and impending federal regulations regarding landfill design, opting for a system based on a central disposal facility appears practical.
- Although the cost of constructing and operating a complying regional landfill is relatively high, it appears to be more economical than implementing a modular incinerator-based system. This holds true even when incinerator system costs are estimated assuming maximum revenues from the sale of steam to a year-round market.
- The potential landfill site should be more thoroughly investigated. More information is needed concerning the site's hydrogeology and the suitability of the island's soil as liner and cover material.
- Strong public interest and the existence of nearby markets indicate that a source separation program warrants a thorough analysis geared towards designing and implementing an island-wide system.

TABLE 3. CAPITAL AND ANNUAL COSTS (EST. 1979) BY TOWN FOR A SELECTED COLLECTION SYSTEM ALTERNATIVE AND REGIONAL LANDFILL

| Towns | Collection System[1] Annual Costs | Collection System[1] Capital Costs | Landfill System[2] Annual Costs | Landfill System[2] Capital Costs |
|---|---|---|---|---|
| Chappaquiddick | $ 6,205 | $26,138 | $ 7,032 | $ 25,529 |
| Chilmark | $12.784 | $36,612 | $22,604 | $ 82,057 |
| Edgartown | $29,578 | $66,378 | $60,780 | $220,644 |
| Gay Head | $ 7,143 | $27,217 | $ 8,288 | $ 30,088 |
| Oak Bluffs | $ 6,850 | $11,500 | $65,300 | $237,055 |
| Tisbury | $ 6,638 | $11,500 | $63,291 | $229,761 |
| W. Tisbury | $20,564 | $46,655 | $23,860 | $ 86,616 |

[1] Option 6 as described in Section 3 was used to generate these figures.

[2] These figures are based on the Landfill System as described in Section 4.

- As soon as possible, the island needs to organize the administrative body which will manage a regional system. There are a number of viable management options available; the important point is to select one so that system design can be finalized around it.

The data developed in this study will provide local decision-makers with additional information upon which an informed selection can be based. This represents another significant step towards achieving a well-designed solid waste management system that will serve the needs of the citizens of Martha's Vineyard.

POPULATION ESTIMATES AND PROJECTIONS
AND WASTE STREAM BACKGROUND DATA

## Population Estimates

Estimating the population of Martha's Vineyard presents several problems, both because of the large annual swings in population (from 9,000 to 50,000) and because of the lack of accurate data. In order to arrive at what we feel are reasonable estimates, it has been necessary to make assumptions and extrapolate from existing data. However, the results shown here represent the most reliable population projections available at the present time.

The data used to derive the population estimates are drawn from several sources including the April 1978 208 Water Quality Management Plan for Martha's Vineyard, steamship authority estimates, and Martha's Vineyard Commission estimates, both from William M. Wilcox's report, "Seasonal and Future Populations of Martha's Vineyard: Summary," and from William Marsvell. Due to the differences among these figures and the limited amount of data, the numbers have been averaged to produce estimates both by town and by season.

The year-round population estimates for the whole island for 1979 are an average of the figures from the Water Quality study (9,020), the Wilcox report (8,782) and a projection by the Joint Transportation Committee in "Transit Development Program, Martha's Vineyard," July 1, 1979 (8,760). The population distributions by town have been derived from the Water Quality study. Projections for 1990 and 2000 result from the averaging of information from the Water Quality, Wilcox, and Joint Transportation Committee reports.

Example: Chilmark's year-round population in 2000

- Year-round population in 2000 from Water Quality report . 563.5
- Percent of island population in Chilmark in 2000 . . . . 5.1%

Androscoggin Valley estimated residential per capita generation rates:

| | |
|---|---|
| Winter | 2.25 lb./day |
| Summer | 2.48 lb./day |

Hancock County estimated residential per capita generation rates:

| | |
|---|---|
| Towns of < 1,000 | 1.40 lb./day |
| Towns of > 1,000 | 2.00 lb./day |

Estimates by Martha's Vineyard landfill operators and refuse collectors:

| | |
|---|---|
| Chilmark | 2.04 lb./day |
| Tisbury | 3.89 lb./day |
| Edgartown | 3.99 lb./day |

ERG estimates:

| | |
|---|---|
| Oak Bluffs | 2.19 lb./day |

Using this data, generation rates have been estimated as shown in Table 2 of the main text. The actual Martha's Vineyard estimates provided a figure of approximately 4 lb./day during the summer for the three large towns. A figure of 2.5 lb./day was chosen for the rest of the island. It is assumed that "day-trippers" are concentrated in the three large towns and that they generate approximately 50% (or 216 lb./day) of the amount of refuse that overnight residents do. The winter generation rate for the large towns (2.5 lb./day) is slightly higher than the figures derived from the studies to account for industrial activities and occasional visitors. The winter number for the rest of the island is the average of the winter estimates from the two studies.

Several studies conducted previously for Martha's Vineyard, including the "Water Quality Management Study," use significantly higher generation rate estimates. As these are based in part upon national averages, and because they differ greatly from the on-island estimates, they have not been used in this analysis.

The data pertaining to waste composition in the main body of this study (see Table 4) were derived from national estimates drawn from Engineering and Economic Analysis of Waste to Energy Systems. As little or no industrial activity occurs on the island, these estimates of residential and commercial waste composition are appropriate measures in a general way.

The figures in Table 4 in the main text have been derived by averaging the appropriate rows of columns 2-11 from Table A-1 of the Engineering and Economic Analysis study.

# APPENDIX E

Oct. 12, 1981

34 Island Park Rd.
Ipswich, MA 01938

Elliot Taubman, J.D.
Box 277 Westside Rd.
Block Island, RI 02807

Dear Elliot:

As I promised in my letter of October 1, 1981 I have made a preliminary assessment of the methane potential from sewage sludge, seaweed and municipal solid waste (MSW) for Block Island. Also included with this letter are some reprints of reference papers on digestion of seaweed and digestion of MSW for the production of methane gas which you may find interesting.

Sewage sludge is produced from the aerobic treatment of sewage via the activated sludge treatment process employed at the Block Island sewage treatment plant. According to your operator, on the average, approximately 20 pounds of solids are produced each day. If this sludge is produced in a 5 % Total Solids slurry then the daily quantity of sludge produced can be calculated to be:

$$\text{Volume} = \frac{20 \text{ lbs/day}}{0.05} \times \frac{1.0 \text{ gal}}{8.33 \text{ lbs}} = 48 \text{ gal/day}$$

If this sludge is anaerobically digested in a tank at a retention time of 30 days, the required volume will be:

Digester Volume = 30 days x 48 gal/day = 1440 gal

Each tank that is presently not being used at the sewage treatment plant is 50,000 gallons in volume. Therefor to use one of these tanks solely for the digestion of sewage sludge is impractical. A more practical application would be to combine the sewage sludge with seaweed and digest them both together.

If enough seaweed could be harvested from the shores of Block Island one 50,000 gallon tank could be converted to an anaerobic digester to digest both the sludge and the seaweed. If the sludge were to occupy 1440 gallons the seaweed would occupy the remaining 48560 gallons. If it is assumed that a 5 % Total Solids slurry of seaweed is used, the seaweed was held in the digester at a retention time of 30 days, and the initial Total Solids of the seaweed was 60%, the average quantity of seaweed can be calculated to be:

$$\text{Seaweed Harvest/day} = \frac{48560 \text{ gal}}{30 \text{ days}} \times \frac{8.33 \text{ lbs}}{\text{gal}} \times \frac{0.05}{0.60} = 1125 \text{ lbs/day}$$

The potential methane production from a digester recieving 1125 pounds of seaweed and 20 pounds of sewage sludge each day is approximately 2000 $ft^3$/day, if it is assumed that 70% of the sewage sludge and 40% of the seaweed can be converted to methane in 30 days. Of this gross production approximately 20 - 30% will have to be returned to the digester to keep it heated at mesophilic (95° F) temperatures. Therefor the net methane potential will be 1400 - 1600 $ft^3$/day.

The cost of producing methane in this fashion is dependent upon several factors which will have to be carefully assessed. These factors include the cost of harvesting the seaweed, the final disposal method of the material from the digester and associated costs, the use of the gas and the cost of gas cleaning, and the cost of converting the tank to a digester ( which will include insulation, a gas cover, a mixer, and equipment associated with transporting the gas in a safe manner from the digester to where it will be used). At present it is difficult to determine what many of these costs will be but I believe it is a fair assumption that conversion of the tank to a digester will not be a major factor. Due to the small quantity of gas being produced, a very careful economic analysis should be performed to see if it is even practical.

The conversion of MSW to energy presents a significantly different situation. If it is assumed that 3.5 pounds of MSW are produced per person per day and using the sewage treatment plant data indicating a ten fold increase in sewage flow from the winter to the summer, and a base Block Island population of 500, the MSW production will be 0.875 tons/day in the winter and 8.75 tons/day in the summer. Thus a daily average for the year of 4.8 tons/day is assumed. A yearly total of 1750 tons of MSW results.

As I mentioned when I was out at Block Island, due to the problems both in preparing MSW for digestion in a conventional digester and in mixing the MSW once it is in the digester, conversion of MSW to methane via this process is not recommended. Since you are considering burning peat for electricity generation, combining the MSW with the peat seems to be the most logical option. According to the data in the report issued by URI on peat reserves on Block Island, 95,000 - 190,000 tonnes (104,700 - 209,500 tons) of peat are avaliable from 50% of the wetland area. If the peat were to be burned over a 20 year period the annual peat usage would be 5,200 - 10,500 tons/year. Therefor adding MSW to the peat would result in approximately 17 - 33% increase in the amount of material to be burned, thus not requiring a significant increase in the size of the peat facility.

If you are interested in an alternative method of converting MSW to methane gas, I suggest you consult with Dr. Jewell on the applicability of his dry fermentation process to solid wastes.

Although not exactly encouraging, I hope this information will be useful to you. I look forward to hearing from you in the future and hope your project is a success. If I can be of any further service please do not hesitate to call me.

Very truly yours,

Alfred P. Leuschner

# APPENDIX F

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

In re: Arrangements Between
ELECTRIC UTILITIES and
QUALIFYING COGENERATION
and small Power Production
Facilities.

Docket No. 1549
August 12, 1981

# REPLY BRIEF
# REGARDING COMPLIANCE
# BY BLOCK ISLAND POWER COMPANY


TOWN OF NEW SHOREHAM

Elliot Taubman, Esq.
Energy Coordinator
Town of New Shoreham
P.O. Box 277
Block Island, RI 02807

William J. Gallogly, Esq.
Town Solicitor
Town of New Shoreham
Longolucco & Lenihan
43 Broad Street
Westerly, RI 02891

## ARGUMENT

The arrogance of the Block Island Power Company is quite apparent at this state in the proceedings. After policy decisions have been made by the United States Congress, the Federal Energy Regulatory Commission and this Commission to encourage Cogeneration and small power production, the Company says that they are all wrong and it should be able to continue to use its inefficient diesel generators for all power production. Fortunately for the future of Block Island, the policy decisions have already been made to encourage such small power generation. Contrary to the protestations of the Company, the use of cogeneration, wind and solar power on Block Island will be fully in keeping with national policy and is likely to benefit all Block Island rate payers in reduced use of imported petroleum. The only entity on Block Island with any cause to complain would be Island Services, Inc. However, compliance of the Power Company with this Commission's existing regulations will allow the rate payers of Block Island to reduce their tribute to Island Services, which has for too long victimized the Island residents.

### Wind Generation Potential

The Company has the burden of proof in this proceeding and has failed to come forth with any competent and material evidence to overturn the considered view that small power production will reduce petroleum use. The only evidence submitted is Exhibit 4, the ratios of wind to diesel fuel use and total

fuel use.[1] It is submitted that to the extent this exhibit shows anything it is that the wind turbine, when it is working, increases the total fuel efficiency on the system. The clear test cases are the months of April 1980 and 1981. The Company tries to cite other months, but fails to indicate their comparability. It must be noted that, according to the Company's own testimony, the MOD-OA wind turbine was hit by lightning in June 1981 and this explains the negative production in that month. The better test may be July 1980 and 1981 for which the Company should be able to now supply data. In any case, there is obvious evidence of reduced oil use overall since the MOD-OA turbine has been in operation.

Competition

The Power Company is simply wrong in its citation to Statues 39-3-1 and 39-3-2. These statutes must be interpreted consistently with Section 210 of PURPA. It is quite clear (and explicitly stated in the FERC regulations) that if the term "sell electric power" in 39-3-1 and 39-3-2 were interpreted to apply to "qualifying facilities" then it would be preempted under the authority of Section 210 (e) (i). Section 210 (e) (i) explicitly gives FERC preemption authority over state laws where "necessary to encourage cogeneration and small power production." 210 (e) (i). In fact, part of the philosophy of section 210 is to encourage competition

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[1] Exhibit 4 does not indicate what the "ratios" in the column on the far right are. It now appears that these are kilowatt-hours per gallon rather than gallons per kilowatt-hour. The units of measurement have no impact on the arguments in the Town's Brief-in-Chief; the wind turbine still increases total System efficiency; and even when lugging the sewer plant diesels have a fuel efficiency greater than the System average.

between small power producers and regulated electric utilities. "The conferees wish to make clear that cogeneration is to be encouraged under this section....the conferees do not intend cogenerators or small power producers to be subject, under the commission's rules, to utility-type regulation. Conference Report to accompany H.R. 4018, Public Utilities Regulatory Policies Act, Report No. 95-1292 (Oct. 5, 1978) at 98. The apparent thought is that without the discipline of the market-place, monopoly utilities would not fully exploit new and more efficient technologies. It is precisely because of such arrange-ments as that between Island Services, Inc., and Block Island Power Company, that stringent regulation to encouraage competition is needed. As Professor Alfred Kahn noted in 1 Economics of Regulation 17 (New York, 1970) the purpose of regulation of utilities is to take the place of competition. Hopefully, this bit of creative legislation - Section 210 - will encourage the greatest levels of efficiency.

System Control Report

The Power Company has attached a report: David Curtice and James Patton, "Operations of Small Wind Turbines on a Distribution System" (Systems Control, Inc., 1981) as part of its brief. This paper (to be referred to as the Report) cannot be considered as evidence and is not a government document of which administrative notice may be had. Further, the Report itself indicates that only utility company engineers were consulted in doing the report, rather than public officials or consumer representatives. Since the actual numbers of the Report are not available, the only

comment one can make is about its assumptions and conclusions. The assumptions in the Report are unremarkable except for the claim that shut-off at the individual wind generator is necessary to protect utility repair personnel. The Report cites no authority for this proposition and gives no examples of specific wind systems where this would be no problem. In fact, the two wind systems marketed on Block Island (newspaper advertisement attached), the Jacobs and Bergey systems, have built-in Systems, have built-in System protection so they cannot operate if the utility grid is not energized. If there is some reason for the argument for specific disconnection (and therefore a charge for this) the Company should have come forward with competent evidence on this point. All that exists in the record is the unsupported conclusion of the Company president who made no claim to expertise in this area (a specialized area of electrical engineering).

While the Report is not evidence as to Block Island Power Company, it has some interesting conclusions from the actual numerical studies done. These were in the areas of system reliability and stability. Some of these conclusions which are favorable to wind power are:

"In general, reclosing on a line-comutated inverter is not a problem because out-of-phase sychronization is not possible when the interconnection point is at the dc bus." (Report at 14)

"Wind Turbines on a feeder tend to <u>decrease</u> the voltage drop along the feeder...." /<u>emphasis added</u>/ (Report at 14)

"Based on the distribution system studied, present voltage

regulation equipment was found sufficient for regulating voltage with various penetrations of small wind turbines affecting the feeder's voltage profile." (Report at 14).

The only generally negative point would be the comment that "if the utility's control process is designed to minimize tie-line flow deviations from scheduled exchange with neighboring utilities, then generator/load mismatches slow up as increased control error and decreased system performance". However, this point is immaterial on Block Island since it is not interconnected with any other utility.

## Connection Costs

The short answer to the Company's arguments on connection costs are that the Narragansett Electric approach has already been found reasonable by this Commission. The Company has failed to indicate what "necessary" financing would be displaced by the five-year payback of connection costs.[2]

## Conclusion

It is in the public interest that a meaningful avoided cost be determined for the Block Island Power Company and that no unreasonable conditions of service be imposed on cogenerators and small power producers.

---

[2]On questioning by counsel for the Town, the Company President indicated that a substantial sum was being spent on a new Company building. There has been no ruling by this Commission that the new building is necessary or beneficial to the rate payers.

Respectfully submitted,

Town of New Shoreham
by Elloit Taubman
William J. Gallogly

## Certification

This is to certify that a copy of the foregoing Reply Brief on Compliance by Block Island Power Company has been sent postage prepaid to Peter V. Lacouture, Esq., Michael A. Postar, Esq., and Hugo T. Ricci, Esq. This 11th day of August, 1981.

Elliot Taubman

# Block Island Power Co.

P. O. BOX 518
BLOCK ISLAND, RHODE ISLAND 02807

Phone 466-2323

For April 27, 1981

| | Plant Generators | Net Windturbine | Fuel | Net KWH | Ratio |
|---|---|---|---|---|---|
| 1/80 | 247,500 | 1758 | 22,784 | 192,753 | 8.46 |
| 2/80 | 231,800 | 46 | 23,694 | 171,000 | 7.22 |
| 3/80 | 250,400 | 8153 | 20,029 | 195,000 | 9.74 |
| 4/80 | 224,200 | 0 | 33,203 | 181,654 | 5.48 |
| 5/80 | 298,200 | 15,144 | 34,888 | 231,427 | 6.64 |
| 6/80 | 527,700 | 0 | 47,399 | 372,760 | 7.86 |
| 7/80 | 680,400 | 0 | 56,629 | 532,084 | 9.40 |
| 8/80 | 740,900 | 17,666 | 62,015 | 575,956 | 9.26 |
| 9/80 | 598,000 | 14,729 | 52,294 | 382,889 | 7.32 |
| 10/80 | 304,800 | 18,200 | 35,816 | 254,431 | 7.11 |
| 11/80 | 235,200 | 49,273 | 27,180 | 215,153 | 7.91 |
| 12/80 | 228,800 | 35,976 | 27,018 | 180,412 | 6.67 |
| 1/81 | 254,400 | 19,247 | 25,831 | 201,196 | 7.79 |
| | | | | | filed (7.91) |
| 2/81 | 216,500 | 32,211 | 22,695 | 191,475 | 8.44 |
| 3/81 | 201,400 | 43,263 | 21,026 | 174,892 | 8.32 |
| 4/81 | 210,100 kwh | 51,404 | 18,737 | 196,290 | 10.48 |
| 5/81 | 358,500 | 19,978 | 32,235 | 264,343 | 8.2 |
| 6/81 | 547,500 | (54) | 44,492 | 382,988 | 8.61 |

18/144.91

8:05

FINAL

ENVIRONMENTAL IMPACT STATEMENT

WASTEWATER COLLECTION AND TREATMENT FACILITIES

NEW SHOREHAM, RHODE ISLAND

# United States Environmental Protection Agency

# Region I

JOHN F. KENNEDY FEDERAL BUILDING - GOVERNMENT CENTER - BOSTON, MASSACHUSETTS 02203

measured during this period even approached violations of National Ambient Air Quality Standards or Rhode Island Ambient Air Standards; and therefcre, the State discontinued the operation of the site.

TABLE 3 1970 Air Sampling Data
Block Island Airport*

| | Pollutants | | |
|---|---|---|---|
| | Particulates | Sulfur-Dioxide | Nitrogen-Dioxide |
| Number of Readings | 13 | 12 | 12 |
| Maximum 24-hours | 66.7 | 15.7 | 86.5 |
| Minimum 24-hours | 19.2 | 7.9 | 5.6 |
| Arithmetic Mean | 36.8 | 8.7 | 12.4 |
| Geometric Mean | 34.2 | - | - |
| Standard Deviation | 1.45 | 1.23 | 2.20 |

*latest complete data available

Source: State of Rhode Island Department of Health

Fish and Wildlife. The predominant fish species found in the waters adjacent to Block Island are: yellow tail flounder, ocean pout, little skate, winter flcunder and spiny doq fish. Commercial fishinq on the Island is limited to the off-season, as the primary occupation of fishermen cn the Island is shellfishing. Lobster harvesting is minimal but clams and scallops are harvested in great quantities. Great Salt Pond, which is protected from the ocean currents, contains at least five species of shellfish commercially available to local fishermen. A marine biologist from the Rhode Island State Department of Natural Resources indicated that about 80% of the shellfish (hard and soft clams, mussels and bay scallops) are located in beds outside of the closure (shown on Map 6) in the open classification of this natural saltwater pond.*

The hard clams and ocean quahogs are distributed around the Island with concentrations of surf clams growing in beds close to shore. The quahogs and hard clams are in waters about one to two miles off-shore predominantly on the western side of the Island. There are clams on the eastern side; however, the density and

* Memo from Edward Wong, Natural Resource Officer, Surveillance and Analysis Division, EPA.

factors", Second Edition, AP-42, p.3.1.5-2 (emission factors for heavy-duty, diesel-powered vehicles), the following annual emissions are predicted from the diesel engines:

| | |
|---|---|
| Particulates | 741#/year |
| SOx (as $SO_2$) | 1540 #/year |
| (Based on ave. sulfur content of 0.2%) | |
| CO | 12820 #/year |
| HC | 2120 #/year |
| NOx (as $NO_2$) | 21200 #/year |
| Aldehydes (as RCHO) | 171 #/year |
| Organic Acids | 171 #/year |

No background CO levels are estimated due to the absence of CO monitoring on Block Island. However, as stated in the section on air quality, no major sources of air pollution (including CO) exist on Block Island.

Due to the relatively low background levels of SO and particulates and the relatively insignificant amounts of air pollutants estimated for this facility, the emissions from the diesel engine will not cause a violation of any applicable ambient air standards.

To determine the effect of the treatment system on the Island's wildlife, various authorities were consulted. According to the Department of the Interior, U.S. Fish and Wildlife Service, neither the wildlife refuge area in Sandy Point nor the "Block Island Vole" will be disturbed by the proposed system. In addition, Dr. Howard Winn, a marine mammalian expert from the University of Rhode Island, who has been studying the seals indicated it was unlikely that the effluent from the proposed treatment plant would adversely affect the reported seals.

The environmentally sensitive areas indicated in Map 8 were evaluated with respect to the physical system proposed by this alternative. There do not appear to be any major conflicts.

Economic Impact. The costs associated with Alternative A are shown on Table 13. The costs for Stage I are based on bid prices of August 1974. All other costs are based on best estimates.

STATE OF RHODE AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

| | | |
|---|---|---|
| IN RE: ARRANGEMENTS BETWEEN ELECTRIC UTILITIES AND QUALIFYING COGENERATION AND SMALL POWER PRODUCTION FACILITIES | : | DOCKET NO. 1549 |

Reply Brief of the Division of
Public Utilities and Carriers

The Company's positions as contained in its proposed terms and conditions and in its brief reflect a significant misunderstanding of sections 201 and 210 of the Public Utility Regulatory Policies Act of 1978 (hereinafter "PURPA" or the "Act").

The Company has predicated its position with regard to the small power production and cogeneration rate upon the following:

> "The Commission should be emphatic in rejecting the notion that small power producers are encouraged either by PURPA or under Rhode Island law to compete with existing electric utilities." (Company brief p. 2) (Citation omitted)
>
> "It is clear that the motivation for installation of a qualifying facility should be to provide electric energy for one's own needs and not to compete with the electric utility" (Company brief p. 22)

Based upon this incorrect reading of the Act the Company has advocated positions not in compliance with the Commission's order of March 20, 1981 which should be rejected.

The issue in this proceeding is whether the tariffs filed by the Division and the Company are in compliance with the spirit and the letter of the Commission's order of March 20, 1981, Order No. 10391.

The Company disputes the Division's avoided fuel cost calculation in the interest of "fair[ness to] both the qualifying facility and the Company's other customers... (Company brief p. 8). No policy considerations or data was introduced which would support the "one-half of the average fuel cost..." position proposed by the Company (Company brief p. 8).

The Company offered a "simultaneous buy and sell arrangement" and rejected as "most unfair" a net output arrangement. (See Company brief p. 8) The Company failed to recognize that PURPA, the FERC regulations and the Narragansett Electric, Blackstone Valley Electric, Newport Electric and Pascoag Fire District tariffs incorporate both types of arrangements with the option of election left to the qualifying facility, not the utility.

The Company proposes to "make payment for purchase of power by way of a credit against the customer's monthly bill." (See Company brief p. 9.) The Company's proposal is inappropriate since there is no requirement that a qualifying facility be a customer of the utility.

The provision for the repayment of interconnection costs, as approved by the Commission in the 210 tariffs of the other four Rhode Island electric utilities is similarly appropriate for Block Island and should be adopted. The Company's discussion of the interest numbers was of no relevance in this compliance proceeding. (Company Brief p. 9)

The Company's attempt to limit the number and aggregate output of qualifying facilities, is contrary to the intent of

the Act and not supported by competent technical testimony or data and should be rejected. (See Company brief p. 12.) The reasoning proffered by Mr. Renz for the limitations contained in paragraph 8 of the Terms and Conditions (BIPC, Exh 3, p. 3) is the fear of loss of load (Company brief p. 13). No actual company experience or technical explanation supported this assertion.

The Company has appended a publication from the United States Department of Energy, Federal Wind Energy Program entitled "Operations of Small Wind Turbines on a Distribution System (March 1981)..." which was not offered as evidence in this proceeding and should not be considered. (Company brief p. 14) (There is no indication that this report studied the Block Island system or that it has any applicability to Block Island).

The Division opposes the Company's tariff condition number 5 which requires insurance. Reasonable interconnection standards obviates the need for such insurance. (See Company brief p. 15) There is no requirement for Block Island Power to obtain similar insurance against possible damage to the qualified facility. Again reasonable interconnection standards make this unnecessary based upon the present record.

There is no basis in the present record for omitting the addition of line losses to the avoided cost calculation as argued by the Company (Company brief p. 17) The Commission has properly left the line loss calculation to each utility, in the first instance.

The Company would not be able to terminate residential service for failure to meet an obligation with regard to interconnection costs. (See Rules and Regulations Governing The Termination of Electric, Gas and Water Services, as amended and Emergency Rules Adopted Pursuant to Order No. 9439, section 3 (a) Insufficient Reasons for Disconnection, p. 2). (See Company brief p. 20-21.)

Respectfully submitted,

Rhode Island Division of Public Utilities and Carriers

By its attorney,

Michael R Postar

Michael R. Postar
Division of Public Utilities
and Carriers
100 Orange Street
Providence, RI 02903

August 7, 1981

CERTIFICATION

I hereby certify that on this 7th day of August, 1981, I mailed by U.S. mail, first class postage prepaid or hand delivered a true copy of the within Reply Brief to counsel of record in this matter.

Pauline Hosford

# APPENDIX G

TO: Norman Dahl, Ted Martin, Bob Ericson

FROM: Elliot Taubman

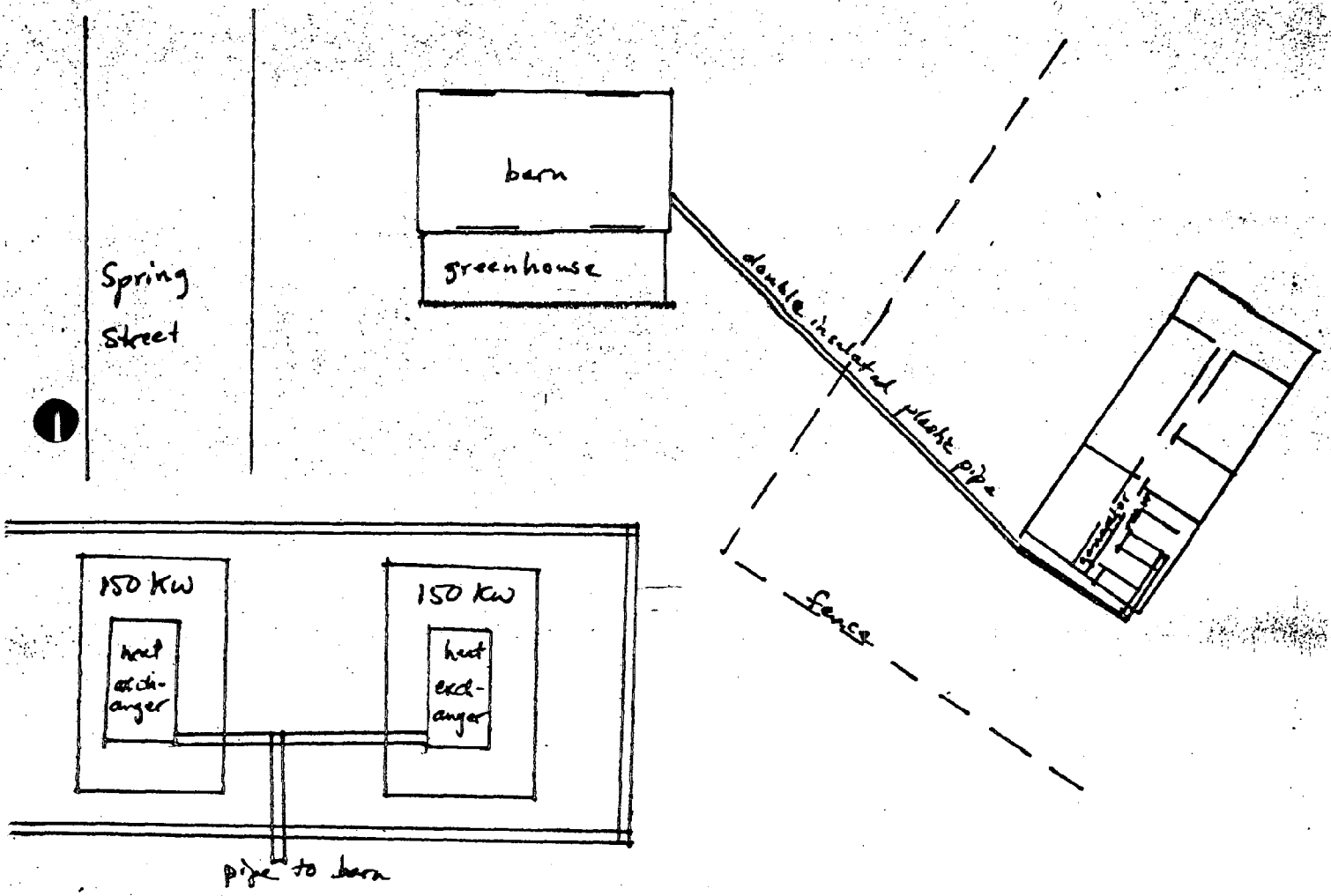
SUBJECT: Proposed Sewer Plant Cogeneration and District Heating System

DATE: May 8, 1982

It appears that we may be able to create a viable cogeneration and district heating system at the Town of New Shoreham Wastewater Treatment Facility together with the Harbor Church Barn. The important factors will be the avoided cost payment from the Block Island Power Company, the alternative cost of fuel and the total system efficiency.

Further development is needed of the concept, however.

I. The system can be diagrammed here:



II. Bob Ericson has previously done the following "back-of-the envelope" calculations:

A. Assumptions:
a. Diesel fuel, 1 gallon = 142,500 Btu
b. Generator efficiency = .9

B. 8 gallons in at 130 hp X .746 X .9 = 87.3 kwh output in one hour.
1,140,000 Btu in ---> ▱ --> 297,867 Btu out in electricity (26.1 % output)

C. Alternatively you should have 12.1 gallons at 225 Hp:
X:746 X .9 = 151.1 kwh
1,724,250 Btu in --> ▱ --> 515,553 Btu out

D. Engine & oil 34% low in TOTEM (diesels have lower in exhaust gas 36% low exhaust gas; more in mechanical meoh energy 29% energy) (Fiat Total Energy Machine; running on natural gas)

Fuel in at $1.20; $9.60 = 87.3 kwh at $ .110 kwh
Fuel in at $1.40; $14.52 = 151.1 kwh at $ .896 kwh
$ 1.40 = $ .128 kwh
heat worth at least $5mm Btu, so $9.60-2.93 = $6.67 (net of $ .076 kwh)
add operation and maintenance and depreciation (assume as much as 50%, although 20% is more reasonable) = .076 + .038 = $ .104 kwh which is still far less than $ .149 kwh (present avoided cost)

III. Other relevant figures:

Town Facility Energy Use

| | Doctors Office | Library | Old Harbor Dock | Town Hall | Sewer Facility |
|---|---|---|---|---|---|
| Heating Oil | 3,546 gallons | 1,020 gals. | | 1,170 gals. | |
| Electricity | 7,588 kwh | 11,133 kwh | 24,400 kwh | 5,252 kwh | Pump Sta. 15,555 Sewer Plant 47,640 Kwh |
| Diesel | | | | | 40,000 gals |

Equivalents - Btu's; 1 wh = 3,414.43 Btu; 1 gal Heating oil = 138,690 Btu; 1 gal. diesel = 135,425 Btu.

IV. Issues to be decided in calculations:

A. Secondary heat exchanger efficiency
B. Primary heat exchanger efficiency
C. Generator efficiency
D. Accounting allocation for present O & M (operation and maintenance) and depreciation.
E. Future trends for BIPCo avoided cost.
F. What would have to be shown in application to R.I.P.U.C.
G. Relationship to windfarm.
H. Possible wheeling to other town facilities; ice house.

# OPERATING CHARACTERISTICS OF TWO CATERPILLER DIESEL GENERATORS AT BLOCK ISLAND SEWER PLANT EACH CAPABLE OF 150 KILOWATT PRODUCTION

**RATINGS:**

Maximum Power—Horsepower capability which can be demonstrated within 5% at the factory.

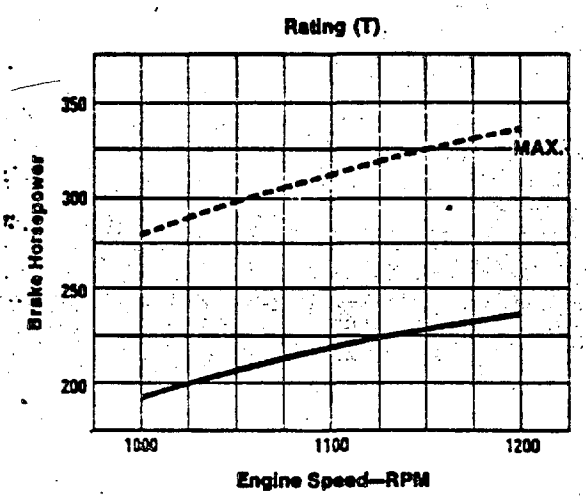
**STANDARDS:**

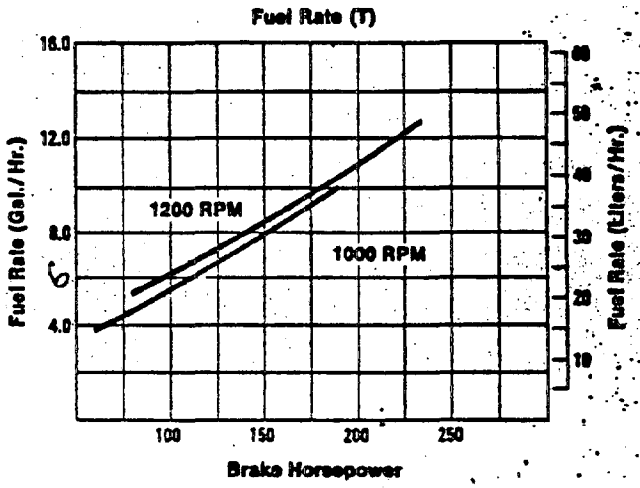
Ratings based on SAE standard conditions of 29.38 in. (746 mm) of mercury and 85°F (29°C).

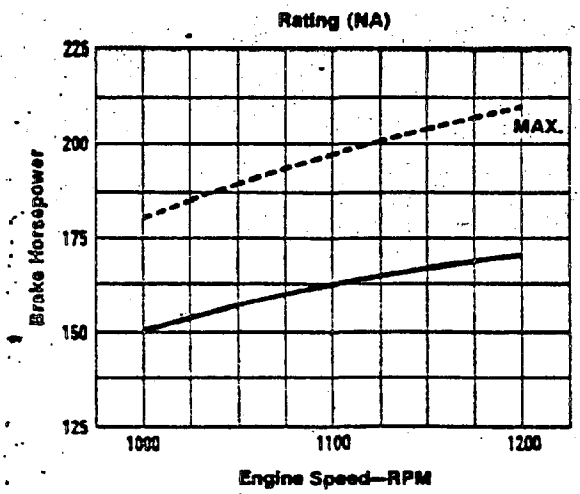
**ALTITUDE AND TEMPERATURE CAPABILITIES**

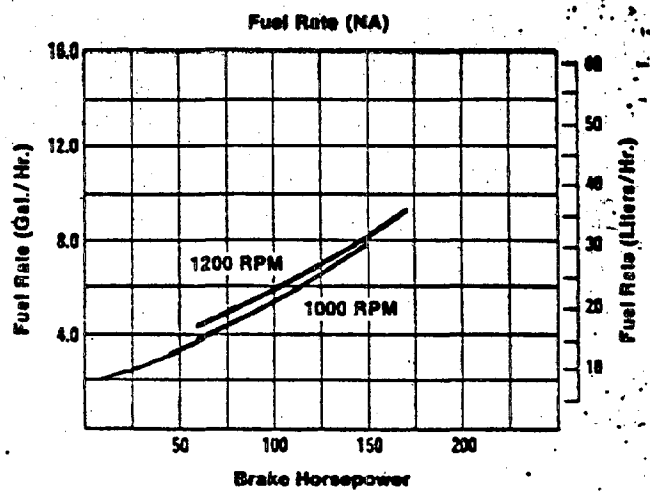
| | 60 Hz 1200 RPM | 50 Hz 1000 RPM |
|---|---|---|
| Turbocharged | 7000 ft. and 60°F (2100m) (16°C) | 7000 ft. and 60°F (2100m) (18°C) |
| Naturally Aspirated | 5000 ft. and 70°F (1500m) (21°C) | 3000 ft. and 80°F (900m) (27°C) |

Between Operating Capability and 7000 ft. (2100m) and 60°F (16°C) derate 6% for each 1000 ft. (300m) and 2% for each 10°F (6°C). Above 7000 ft. and 60°F, consult your Caterpillar representative.




KW = BHP X 0.746 X generator efficiency.

Fuel consumption applies to standard electric set engine W/O fan, based on fuel oil having a gross heat value of 19,500 BTU per pound (10,830K-cal/Kg) and weighing 7.12 pounds per U.S. gallon (855 gm/ltr).

July 30, 1982

Elliot Taubman
Block Island Development Foundation
P.O. Box 619
Block Island, RI 02807

Dear Elliot:

The BLOCK ISLAND ENERGY INSTITUTIONS REPORT attributes to me at least two conclusions that I did not make.

When you asked for preliminary calculations on the sewage treatment plant's diesel generators, I worked within the context of the assumptions provided. I did not determine that suitable load matches could be acquired at reasonable costs, and so I cannot conclude that the "Sewer Commission would make a profit selling power back" to the existing utility.

Nor is it my conclusion that "such sales could help to even out" any "wintertime uneveness [sic]" in wind power production. I cannot imagine how a qualifying cogeneration facility can be required to compensate for perceived deficiencies in a qualifying wind generation facility, nor do I see a natural complement.

Calculations in Section II on page G-2 were separated from specific qualifications noted on the original sheet, although many of the issues are listed in Section IV on page G-3.

I trust that appropriate corrections can be made to the REPORT, even if only by inserting this letter of qualification as page G-5. Thank-you for your attention to this matter.

Sincerely,

Bob

Robert Ericson

cc: Walter Cooper

# APPENDIX H

## INTERNAL-COMBUSTION ENGINE AND GAS-TURBINE GENERATING PLANTS (Continued)

matters as percent of ownership by respondent, name of co-owner, basis of sharing output, expenses, or revenues, and how expenses and/or revenues are accounted for and accounts affected. Specify if lessor, co-owner, or other party is an associated company.

5. Designate any plant or portion thereof leased to another company and give name of lessee, date and term of lease and annual rent and how determined. Specify whether lessee is an associated company.

6. Designate any plant or equipment owned, not operated, and not leased to another company. If such plant or equipment was not operated within the past year, explain whether it has been retired in the books of account or what disposition of the plant or equipment and its book cost are contemplated.

| PRIME MOVERS Continued | GENERATORS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Rated hp. of Unit (g) | Year Installed (h) | Voltage (i) | Phase (j) | Frequency or d.c. (k) | Name Plate Rating of Unit in Kilowatts (l) | Number of Units in Plant (m) | Total Installed Generating Capacity in Kilowatts (name plate ratings) (n) | Line No. |
| 60 | 1946 | 240 | 3 | 60 | 30 | #5 | 30 | 1 |
| 360 | 1952 | 2,400 | 3 | 60 | 245 | #7 | 275 | 2 |
| 340 | 1969 | 2,400 | 3 | 60 | 225 | #8 | 500 | 3 |
| 660 | 1959 | 2,400 | 3 | 60 | 400 | #9 | 900 | 4 |
| 800 | 1965 | 2,400 | 3 | 60 | 500 | #10 | 1,400 | 5 |
| 225 | 1969 | 2,400 | 3 | 60 | 150 | #11 | 1,550 | 6 |
| 300 | 1972 | 416 | 3 | 60 | 200 | #12A | 1,750 | 7 |
| 1,660 | 1972 | 2,400 | 3 | 60 | 1,000 | #13 | 2,750 | 8 |
| 1,660 | 1972 | 2,400 | 3 | 60 | 1,000 | #14 | 3,750 | 9 |
| | | | | | | | | 10 |
| | | | | | | | | 11 |
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| | | | | | | | | 40 |

# 200 KILOWATT WIND TURBINE SPECIFICATIONS

## Rotor

| | |
|---|---|
| Number of blades | 2 |
| Diameter, ft | 125 |
| Speed, rpm | [31.5]* |
| Direction of rotation | Counterclockwise (looking upwind) |
| Location relative to tower | Downwind |
| Type of hub | Rigid |
| Method of power regulation | Variable Pitch |
| Cone angle, deg | 7 |
| Tilt angle, deg | 0 |

## Blade

| | |
|---|---|
| Length, ft | 59.9 |
| Material | Wood composite |
| Weight, lb/blade | 2600 |
| Airfoil | NACA 23000 |
| Twist, deg | 8 |
| Solidity, percent | 4 |
| Tip chord, ft | 2.0 |
| Root chord, ft | 5.2 |
| Chord taper | Linear |

## Tower

| | |
|---|---|
| Type | Pipe truss |
| Height, ft | 93 |
| Ground clearance, ft | 37 |
| Hub height, ft | 100 |
| Access | Hoist |

## Transmission

| | |
|---|---|
| Type | Three-stage conventional |
| Ratio | 45:1 |
| Rating, hp | 460 |

## Generator

| | |
|---|---|
| Type | Synchronous ac |
| Rating, kVA | 250 |
| Power factor | 0.8 |
| Voltage, V | 480 (three phase) |
| Speed, rpm | 1800 |
| Frequency, Hz | 60 |

## Orientation drive

| | |
|---|---|
| Type | Ring gear |
| Yaw rate, rpm | 1/6 |
| Yaw drive | Electric motors |

## Control system

| | |
|---|---|
| Supervisory | Microprocessor |
| Pitch actuator | Hydraulic |

## Performance

| | |
|---|---|
| Rated power, kW | 200 |
| Wind speed at 30 ft, mph (at hub): | |
| Cut-in | 6.9 (9.5) |
| Rated | 18.3 (22.4) |
| Cut-out | 34.2 (40) |
| Maximum design | 125 (150) |

## Weight (klb)

| | |
|---|---|
| Rotor (including blades) | 12.8 |
| Above tower | 45.5 |
| Tower | 44.0 |

## System life

| | |
|---|---|
| All components, yr | 30 |

Note: Most of the information here was provided by DOE-NASA; the machine was down rated at the request of the Power Company to have a 150 KW output at 31 rpm.

BLOCK ISLAND POWER COMPANY

SCHEDULE OF TAXES
10/1/79 TO 4/30/80

U N A U D I T E D

| | CURRENT PERCENT | YTD PERCENT | CURRENT DOLLARS | YTD DOLLARS |
|---|---|---|---|---|
| TAXES | | | | |
| PAYROLL TAXES | 3.95 | 2.45 | 1613 | 6876 |
| RI SALES TAX -CURR | 2.58 | .54 | 1053 | 1516 |
| PROPERTY TAXES | 3.13 | 3.18 | 1277 | 8939 |
| REGISTRATIONS | .00 | .16 | 0 | 436 |
| RI GROSS EARN TAX | 4.16 | 4.06 | 1700 | 11400 |
| PUBLIC UTIL CHGS | .00 | .13 | 0 | 354 |
| TOTAL TAXES | 13.81% | 10.51% | $ 5643 | $ 29520 |

SCHEDULE OF MISC OTHER EXPENSE
10/1/79 TO 4/30/80

U N A U D I T E D

| | CURRENT PERCENT | YTD PERCENT | CURRENT DOLLARS | YTD DOLLARS |
|---|---|---|---|---|
| MISC OTHER EXPENSE | | | | |
| AMORT - L/T DEBT | .19 | .19 | 76 | 533 |
| INT EXP-MTGE&DEB | 9.46 | 7.44 | 3865 | 20890 |
| INTEREST - OTHER | .65 | 2.10 | 265 | 5900 |
| OFFICER'S LIFE INS | -.07 | .51 | -29 | 1430 |
| RES & DEV EXPENSES | 2.23 | 3.37 | 912 | 9449 |
| CATV EXPENSE | .30 | 1.75 | 121 | 4915 |
| TOTAL MISC OTHER EXPENSE | 12.75% | 15.35% | $ 5209 | $ 43117 |

BLOCK ISLAND POWER CO.
P. O. BOX 518
BLOCK ISLAND, RHODE ISLAND 02807

Using the current rate structure for the 12 months ended April 30, 1980 with historical expenses for the same period, we derive Column #1 showing a revenue deficiency of $36,279. Using the same rates and forecasting additional expenses presently being experienced, we derive Column #2 with a revenue deficiency of zero. If we do not increase the current rates, we would have insufficent funds to pay creditors and interest charges.

| | Column #1 | Temporary Increase Column #2 |
|---|---|---|
| Operating revenues | $501,453 | $ 501M |
| Fuel adjustments | 186,511 | 357M |
| Other revenues | 6,140 | 6M |
| | 694,104 | 864M |
| Operating expenses | 654,801 | 655M |
| Additional Gross Earnings Tax | - | 8M |
| Increased fuel costs | - | 171M |
| Other operating expense increase | - | 25M |
| Investment tax credits | (2,623) | (2M) |
| 9.95% Return on Rate Base | 78,205 | 42M |
| Additional Federal Income Tax | - | - |
| | 730,383 | 899M |
| Revenue deficiency | (36,279) | (35) |
| Additional operating revenue from proposed temporary rates for a full year | - | 35 |
| Revenue deficiency with proposed rates | - | - |

BLOCK ISLAND POWER COMPANY

SCHEDULE OF DISTRIB-OPERATIONS
10/1/79 TO 4/30/80

U N A U D I T E D

| | CURRENT PERCENT | YTD PERCENT | CURRENT DOLLARS | YTD DOLLARS |
|---|---|---|---|---|
| DISTRIB-OPERATIONS | | | | |
| SUPERVISION | .26 | .27 | 106 | 764 |
| STATION EXPENSE | 1.27 | .59 | 520 | 1658 |
| OVERHEAD LINES | .26 | 2.13 | 106 | 5986 |
| ST LIGHTS&SIGNALS | .00 | .11 | 0 | 309 |
| METERS | .07 | .16 | 27 | 458 |
| CUST INSTALLATION | 1.54 | .47 | 628 | 1328 |
| TOTAL DISTRIB-OPERATIONS | 3.39% | 3.74% | $ 1387 | $ 10503 |

SCHEDULE OF DISTRIB-MAINT
10/1/79 TO 4/30/80

U N A U D I T E D

| | CURRENT PERCENT | YTD PERCENT | CURRENT DOLLARS | YTD DOLLARS |
|---|---|---|---|---|
| DISTRIB-MAINT | | | | |
| SUPERVISION | .26 | .27 | 106 | 761 |
| OVERHEAD LINES | 4.37 | 1.48 | 1785 | 4145 |
| LINE TRANSFORMERS | .00 | -.04 | 0 | -121 |
| ST LIGHTS&SIGNALS | .00 | -.01 | 0 | -17 |
| METERS | .00 | .38 | 0 | 1070 |
| TOTAL DISTRIB-MAINT | 4.63% | 2.08% | $ 1891 | $ 5838 |

SCHEDULE OF CUST A/C EXP-OPER
10/1/79 TO 4/30/80

U N A U D I T E D

| | CURRENT PERCENT | YTD PERCENT | CURRENT DOLLARS | YTD DOLLARS |
|---|---|---|---|---|
| CUST A/C EXP-OPER | | | | |
| SUPERVISION | 1.36 | 1.12 | 554 | 3136 |
| METER READING | .92 | .75 | 375 | 2118 |
| RECORDS & COLL EXP | 2.11 | 3.30 | 861 | 9255 |
| DIGITAL COMP SUPP | .00 | .05 | 0 | 148 |
| RENT -DIGITAL COMP | .80 | .59 | 329 | 1644 |
| TOTAL CUST A/C EXP-OPER | 5.19% | 5.81% | $ 2119 | $ 16301 |

BLOCK ISLAND POWER COMPANY

SCHEDULE OF ADMIN EXP - OPER
10/1/79 TO 4/30/80

U N A U D I T E D

| | CURRENT PERCENT | YTD PERCENT | CURRENT DOLLARS | YTD DOLLARS |
|---|---|---|---|---|
| ADMIN EXP - OPER | | | | |
| OFFICE SALARIES | 2.14 | 2.16 | 876 | 6072 |
| STAFF TRAINING | .00 | .03 | 0 | 85 |
| OFFICE SUPP & EXP | .79 | 2.14 | 322 | 6003 |
| OVERHEAD-ASSOC CO | -.67 | -.58 | -276 | -1631 |
| OUTSIDE SERVICES | 2.45 | 6.15 | 1000 | 17276 |
| PROPERTY INSURANCE | 3.10 | 3.15 | 1265 | 8855 |
| EMPLOYEE BENEFITS | 1.40 | 1.48 | 572 | 4157 |
| TRAVEL & MISC EXP | .00 | .11 | 0 | 298 |
| TRANSPORTATION EXP | .00 | .29 | 0 | 801 |
| TOTAL ADMIN EXP - OPER | 9.20% | 14.93% | $ 3759 | $ 41917 |

SCHEDULE OF ADMIN EXP - MAINT
10/1/79 TO 4/30/80

U N A U D I T E D

| | CURRENT PERCENT | YTD PERCENT | CURRENT DOLLARS | YTD DOLLARS |
|---|---|---|---|---|
| ADMIN EXP - MAINT | | | | |
| MAINT GEN PLANT | 1.86 | .57 | 759 | 1608 |
| TOTAL ADMIN EXP - MAINT | 1.86% | .57% | $ 759 | $ 1608 |

BLOCK ISLAND POWER COMPANY

SCHEDULE OF POWER PROD-OPERTNS
10/1/79 TO 4/30/80

U N A U D I T E D

| | CURRENT PERCENT | YTD PERCENT | CURRENT DOLLARS | YTD DOLLARS |
|---|---|---|---|---|
| POWER PROD-OPERTNS | | | | |
| SUPERVISION | .26 | .27 | 106 | 754 |
| FUEL | 67.81 | 57.05 | 27701 | 160191 |
| WATCHMAN | 3.25 | 2.46 | 1326 | 6920 |
| LUBRICATION | 3.45 | 3.43 | 1408 | 9636 |
| FREIGHT | .26 | .52 | 105 | 1446 |
| DOCK RENT | .00 | .18 | 0 | 500 |
| LABOR - OTHER | 3.01 | 2.05 | 1231 | 5759 |
| TOTAL POWER PROD-OPERTNS | 78.03% | 65.96% | $ 31878 | $ 185206 |

SCHEDULE OF POWER PROD-MAINT
10/1/79 TO 4/30/80

U N A U D I T E D

| | CURRENT PERCENT | YTD PERCENT | CURRENT DOLLARS | YTD DOLLARS |
|---|---|---|---|---|
| POWER PROD-MAINT | | | | |
| SUPERVISION | .26 | .27 | 106 | 761 |
| LABOR | 1.72 | 2.37 | 703 | 6655 |
| MAINTENANCE | .29 | .17 | 116 | 467 |
| TRANS EQUIPMENT | .65 | .17 | 266 | 482 |
| GASOLINE | .70 | .55 | 287 | 1554 |
| MISCELLANEOUS | .12 | .56 | 48 | 1559 |
| TOTAL POWER PROD-MAINT | 3.74% | 4.09% | $ 1527 | $ 11477 |

BLOCK ISLAND POWER COMPANY

STATEMENT OF INCOME
10/1/79 TO 4/30/80

SEE ACCOUNTANTS' COMPILATION REPORT

| INCOME | CURRENT PERCENT | YTD PERCENT | CURRENT DOLLARS | YTD DOLLARS |
|---|---|---|---|---|
| ELECTRICITY CHGES | 97.06 | 99.29 | 39655 | 278816 |
| MISC OPER INCOME | 2.85 | .63 | 1164 | 1767 |
| MISC INCOME | .09 | .08 | 36 | 221 |
| TOTAL INCOME | 100.00% | 100.00% | $ 40854 | $ 280803 |
| VARIABLE EXPENSE | | | | |
| POWER PROD - OPER | 78.03 | 65.96 | 31878 | 185206 |
| POWER PROD - MAINT | 3.74 | 4.09 | 1527 | 11477 |
| DISTRIB - OPER | 3.39 | 3.74 | 1387 | 10503 |
| DISTRIB - MAINT | 4.63 | 2.08 | 1891 | 5838 |
| CUST A/C EXP-OPER | 5.19 | 5.81 | 2119 | 16301 |
| ADMIN EXP -OPER | 9.20 | 14.93 | 3759 | 41917 |
| ADMIN EXP - MAINT | 1.86 | .57 | 759 | 1608 |
| TAXES | 13.81 | 10.51 | 5643 | 29520 |
| TOTAL VARIABLE EXPENSE | 119.85 | 107.68 | 48962 | 302372 |
| VARIABLE GROSS MARGIN | -19.85 | -7.68 | -8108 | -21569 |
| FIXED EXPENSE | | | | |
| DEPRECIATION EXP | 13.55 | 13.80 | 5536 | 38752 |
| MISC OTHER EXP | 12.75 | 15.35 | 5209 | 43117 |
| TOTAL FIXED EXPENSE | 26.30 | 29.16 | 10745 | 81869 |
| INCOME BEFORE TAXES | -46.15 | -36.84 | -18853 | -103438 |
| FEDERAL INCOME TAX | .00 | .00 | 0 | 0 |
| NET LOSS | -46.15% | -36.84% | $ -18853 | $-103438 |

BLOCK ISLAND POWER COMPANY

SCHEDULE OF DEFERRED CHARGES
10/1/79 TO 4/30/80

U N A U D I T E D

| | |
|---|---|
| DEFERRED TAXES-FED | -2332 |
| CUST CONSTR ADVANC | -23687 |
| DEP ON INVEST CHGS | -4375 |
| CONTR - AID CONST | -47373 |
| DEFERRED CHARGES | $ -77767 |

APPENDIX I

PEAT AS A FUEL FOR BLOCK ISLAND

## Table I: Cost Data

The following is a summary of cost estimates associated with the facilities necessary to convert peat and trash into fuel gas to power either a 300 or 1000 KW electrical generation station on Block Island, Rhode Island.[1]

| | | 300KW | 1000KW |
|---|---|---|---|
| 1. | Total yearly cost to produce peat cubes, a solid fuel[2] | $ 112,203 | $ 292,734 |
| 2. | Cost per ton of peat cubes | $ 35.62 | $ 28.08 |
| 3. | Total net cost yearly to produce 500 tons of solid fuel from trash to extend peat[3] | $ 29,130 | $ 29,130 |
| 4. | Cost per ton for trash cubes | $ 58.26 | $ 58.26 |
| 5. | Cost per ton for trash extended peat cubes | $ 38.72 | $ 29.46 |
| 6. | Kilowatt-hours of electricity produced per ton of mixed solid fuel[4] | 745 | 745 |
| 7. | Gallons of number #2 fuel oil conserved per year due to substitution of solid fuel for #2 oil[5] | 154,500 | 515,000 |
| 8. | Capital necessary to provide facilities for this operation.[6] | $1,158,500 | $2,638,500 |
| 9. | Estimated yearly cost to produce electricity[6] | $ 342,825 | $ 978,200 |
| 10. | Cost per kilowatt-hour of electricity produced. | 14.70¢/KW-Hr | 12.58¢/KW-Hr |

Notes: See next page

## SPECIAL DATA

All yearly costs include costs for capital calculated as .15 times total capital for the associated facility. This allows a 15 yr depreciation and 12.8% interest to be repaid on borrowed capital. All capital assumed to be borrowed.

Reserves of peat and the supply of trash will provide fuel sufficient to operate the 300KW unit for 140 years or the 1000KW unit for 45 years. The life of the existing landfill area on Block Island is only 5 years under present circumstances. Using the burnable fraction of trash to produce synthesis gas will increase the life of the dump 8 times to 40 years.

1. These are the ultimate capacities for these facilities. Cost data in this report assumes operation at 90% of ultimate capacity.

2. Each year 3150 tons of peat cubes will be produced for the 300KW units. This is 500 tons more than necessary - if the paper cubes are also considered. The excess will be sold as stove fuel for wood stoves. For the 1000KW unit 10,425 tons per year of peat cubes will be produced. The excess 500 tons will be handled the same way.

3. The gross cost is $35 per ton greater than the net cost shown due to the fact that the town will provide a $35 per ton tipping fee for trash removed. Also note, this cost assumes source separation of trash by island residents.

4. This figure is high because 7.5% of the energy required must come from a pilot fuel (#2 fuel oil).

5. All ecletricity on the island presently produced by diesel engines using #2 fuel oil.

6. The facilities to be used would be a trash shredding facility, a trash and peat densifying (cubing) facility, and a gasifier-electrical generation set, and all accessories to these facilities.

Block Island Economic Development Foundation, Inc.

Block Island, Rhode Island 02807

To The Department of Environmental Management
State Office Building
Providence, Rhode Island 02903

From Julia Hayes, Peat Project Biologist
Block Island

A Supplement To Applications For Permits To Conduct Test Diggings Of Peat At Several Locations On Block Island: Summer-Fall, 1981

## Introduction

Block Island, in its eleven square miles, has two hundred wetlands, most of which contain peat. The wetlands formed as an irregularly melting glacier dropped clay, sand, gravel, and rocks to form a rolling, basin-studded moraine. Material washed to the bottoms of low areas formed seals, allowing rain water to accumulate rather than flow quickly through gravel to the sea.

Plants grew, and vegetation falling to the bottoms of the young ponds, partially decayed, formed the first sedimentary peat layers. These deposits, along with clay and sand still washing down from higher areas, began the process by which lakes and ponds fill to become shallower swamps, marshes, and bogs. Plants creeping out over water surfaces gave support to new plants, and the whole formed bog mats over underlying water. These, along with emergent plants growing in shallow water, contributed reed-sedge and moss peats. Peat forms, in this part of the world, in acidic wetlands when plants die faster than the anaerobic (non-oxygen-using) bacteria of such wetlands can break them down. For thousands of years such peat has formed and continues to form on Block Island.

Originally treed, the Island early lost its forests to land clearing, to construction, and to fuel. Wood gone, residents turned to peat for fuel, and many wetlands still show geometric shapes of open water where peat was hand dug in the past, and where new bog mats are beginning to form.

A good harbor, provided late in the nineteenth century, brought relatively inexpensive coal, then heating oil, to Block Island. Peat digging declined, then stopped.

Now a new fuel crisis, the continuing increase in the price of petroleum, has prompted islanders to take a fresh look at their peat reserves. Jon Boothroyd of the University of Rhode Island, with the assistance of two graduate students, Colen Peters and Andrea Pickart, studied certain of the Island's wetlands in 1979. Their work indicates

that the peat reserves are considerable, and warrant at least exploratory diggings. (Boothroyd, Peters and Pickart, 1979.)

This summer, 1981, certain wetlands have been selected for such exploration, and application has been made to the Department of Environmental Management for permission to conduct test digging in specific areas.

## Species On Block Island That Deserve Special Attention

A review of endangered and threatened species in the United States Code of Federal Regulations, Chapter 50, Wildlife and Fisheries, revised October, 1980, indicates that Block Island does not have plants or breeding animals on the endangered or threatened lists.

According to Dr. Irene Stuckey, Professor Emeritus of Botany, the University of Rhode Island, certain Block Island plants do deserve protection. A golden aster (Chrysopsis sp), though not rare, occurs here further north than it is usually found. Golden asters are to be found behind dunes, where their greatest danger would seem to be trampling sneakers taking shortcuts to the beach.

A member of the rockrose family, Hudsonia ericoides L., grows in rare gravelly areas. Dirt bikes are among the greater threats to vegetation in such places.

Cotton grass (Eriophorum) occurs on one privately owned wetland, not one of those considered in the present applications.

The following members of the orchid family: Habeneria clavellata, H. flava, H. lacera, and Spirantes cernua as well as the sundews Drosera intermedia and D. rotundifolia were reported from Block Island wetlands in a plant list compiled shortly before World War II. (Marks, unpublished ms., c.1939.) I have looked for these plants, particularly in the areas proposed for exploration, but have not yet found them. Uncommon species have not been found in the wetlands under consideration. This is one reason they were chosen.

The most endangered animal on Block Island appears to be its meadow vole, a variant of the more widely occurring Microtus pennsylvanicus. This animal is threatened on the Island because meadow-grass habitat is diminishing, mowed or overgrown. The meadow vole is not a wetland species.

Richard Bowen, of the Rhode Island Audubon Society, conducted a twelve-day survey of Block Island's breeding birds in June, 1981. With Mr. Bowen's permission I attach a summary of his findings to this paper. (Bowen, unpublished notes, 1981.) Of the areas currently proposed for exploration, only one is near an important bird-breeding ground. Southeast of the wetland below the landfill, number 29, there are about seventy black-crowned night heron nests. For this reason I have recommended that: 1) Test digging be done at the northern end of this wetland, and 2) Any excavation of this wetland be done in non-breeding season.

Peat And The Upper Perched Water Table. Runoff Water.

Eventually, by seepage or by overflow, a certain amount of water from Block Island's wetlands reaches the ocean. This is nicely shown on the ocean side of Franklin and Cooneymus Swamps. A walk along the beach from Cooneymus Road to Dory's Cove Road reveals a low area in the bank just north of Cooneymus Road that, though now dry, carries runoff from these swamps in times of high water. All along the bank are patterns of wet and dry, the wet being seepage from the wetland to the beach.

Were peat to be dug in times of high water, runoff could be sediment filled, with consequent damage to nearby intertidal and subtidal marine organisms. (There is evidence, in the forms of drains and local oral tradition, that islanders used to avoid this problem, and make the task simpler, by letting water out of their wetlands before digging. This water would have been relatively clear, though harmful if released too quickly.)

Such discussion does not seem relevant to present conditions, however. Another phenomenon, the dropping upper perched water table, while ominous in its own right, means that less water is available to run from Block Island's wetlands. This minimizes or even negates possible damage to marine organisms from sediment or from too much fresh water at once. Where runoff does not exist it cannot cause damage. During the month of August, 1981, I checked outlets from the Ambrose Swamp, the Georgian Swamp, and Hal Madison's cattail stand.* The outlets from the Ambrose and Georgian Swamps were dry. The outlet from Mr. Madison's cattails petered out about half way to Trim's Pond, with no surface flow reaching salt water. The wetland south of the landfill does not appear to have any outlet for surface runoff into salt water.

Possible Increased Water Storage In Dug Areas

Peat digging would serve a double purpose. Fuel would be obtained; and space provided by its removal, refilled with rain water, would restore some of the open water area lost to Block Island in recent decades. This has obvious value for fire protection when the wetland is near buildings. It could serve, as well, to augment fresh water reserves. And it could provide increased habitat for ducks, which, according to Arthur Rose, DEM representative whose family has lived on the Island for generations, has diminished significantly in recent years.

To insure that water rather than dry hollows will result from peat digging, it is suggested that a probe and dig approach be used. Probes would show how far digging could proceed, and the seal would not be broken letting all the water out. It is possible to repair seals, but it is far better not to break them to begin with. Though labor intensive, the probe and dig approach, in Block Island's small wetlands, seems more practical than such methods for determining peat depth as radar or gravity meters.

*Red Gate Farm

Wetlands Proposed For Test Diggings. Their Dominant and Frequent Plants.

A crane and shovel will perform all test diggings, with perhaps a little supplemental handwork. The machine will stand on a firm dry spot at the edge of each wetland.

I Ambrose Swamp

The test box, at the edge of the wetland, combines shrub swamp--most of the box, with robust shallow Phragmites marsh and a bit of lightly vegetated open water.

Myrica pennsylvanica, Bayberry
Vaccinium, High bush blueberry
Phragmites communis, Reed
Typha angustifolia, Narrow leaved cattail; less frequent than Phragmites
Sphagnum moss; toward south (water) side of box
Triadenum virginicum (also called Hypericum virginicum), Marsh St. Johnswort
Lycopus, water horehound
Glyceria, Manna grass
Woodwardia virginica, Virginia chain fern
Rhus radicans, Poison ivy
Decodon verticillatus, frequent, all along edge of open water
Lemna, duckweed; floating in water under Decodon
Nymphaea, water lily; some at east side of open water
Cuscuta species, Dodder; parasitic on other plants at edge of water

II Madison Cattail Stand (Red Gate Farm)

If this were large enough, it would be a robust shallow marsh, but there is well under an acre of wetland here. The test box contains three dominant species:

Typha angustifolia, Narrow-leaved cattail
Impatiens capensis, Jewelweed
Najas species, Naiad

III Landfill South

South of the landfill a dry, sandy area, home to broken glass and such opportunistic plants as ragweed and Japanese knotweed, leads to a band of rose, blackberry, and smilax, then elderberry and the edge of a varied wetland. The test box here is in shallow marsh, mostly Phragmites dominated, but the far southwest corner of it goes into cattail area. Phragmites and swamp rose mallow are the most frequent plant species.

Phragmites communis, Reed
Hibiscus palustris, Swamp rose mallow
Woodwardia virginica, Virginia chain fern
Typha latifolia and Typha angustifolia, cattails

IV Georgian Swamp

The test box area of the Georgian Swamp, though classified as robust deep marsh, does not now have standing water, though the ground between tussocks of Virginia chain fern is soft and wet. The original test box was to have been at the north end of the Georgian Swamp, but the owner at that end changed his mind; the box has been moved to the southern end. All open water is bordered by Decodon. Otherwise, the main difference between north and south is that north has more reed, cattail, and Virginia chain fern, and south tends toward sensitive fern, vervain and boneset beyond the decodon border. South is, as species indicate, drier. Back from the wettest area are smooth rose, blackberry and bayberry.

Woodwardia virginica, Virginia chain fern; common
Osmunda regalis L, Royal fern; one clump
Phragmites communis, Reed
Typha latifolia and Typha angustifolia, cattails
Decodon verticillatus, water willow
Triadenum virginicum, Marsh St. Johnswort
Spaghnum moss, in northern section especially
Onoclea sensibilis, Sensitive fern
Verbena hastata, Blue vervain
Eupatorium perfoliatum, Boneset
Rosa blanda, Smooth rose
Rubus, blackberry
Myrica pennsylvanica, Bayberry
Cuscuta species, Dodder; parasitic on other plants at edge of water

Summary of categories of breeding probably on attached list of 85 species seen Atchetin June 8 and June 10, 1981.

| Confirmed Breeding | | Probable Breeding | Possible Breeding | Transients |
|---|---|---|---|---|
| Green Heron | Blue Jay | Snowy Egret | Scarlet crested Cormorant | Common Loon |
| Black crowned Night Heron | C. Crow | American Bittern | Cattle Egret | Gray Phalarope |
| White Ibis | Black capped Chickadee | Mallard | Glossy Night Heron | Greater Shearwater |
| Canada Goose | Carolina Wren | Long-eared Owl | Geese (?) | Sooty Shearwater |
| Black Duck | Mockingbird | House Wren | Common Gallinule | Fulmar |
| Gadwall | Catbird | Cedar Waxwing | Black billed Cuckoo | Great Cormorant |
| Teal Duck | Brown Thrasher | Red-eyed Vireo | Great Horned Owl | Bald Eagle |
| Marsh Hawk | Robin | Cardinal | Hummingbird | Osprey |
| Kestrel | Starling | | Wood Pewee | Black billed Plover |
| Pheasant | White-eyed Vireo | | Chestnut-sided Warbler | Ring-billed Gull |
| Bobwhite | Yellow Warbler | | Prairie Warbler | Laughing Gull |
| Oystercatcher | C. Yellow-throat | | Chipping Sparrow | Common Tern |
| Clapper Rail | House Sparrow | | Swamp Sparrow | Blue winged Warbler |
| Upland Sandpiper | Redstart | | | |
| Black bellied Plover | Red-wing | | | |
| Herring Gull | Common Grackle | | | |
| Ring-billed Gull | Cardinal | | | |
| Green Crab | House Finch | | | |
| Belted Kingfisher | Goldfinch | | | |
| Flicker | Towhee | | | |
| Long-billed Marsh Wren | Savannah Sparrow | | | |
| Willet | Grasshopper Sparrow | | | |
| Clapper Rail | Sharp-tailed Sparrow | | | |
| Tree Swallow | Song Sparrow | | | |
| Bank Swallow | | | | |
| Barn Swallow | | | | |
| Orange Swallow | | | | |
| | 51 Species | 8 Species | 13 Species | 13 Species |

Excerpt from Governor's Energy Office

Report on Peat Potential on Block Island

5.3 Some possible alternative uses of the peat

Two uses are suggested for the peat resources of Block Island: 1) as fuel for a 1-3 megawatt electrical-generating plant; and 2) use as a home-heating source in individual wood stoves. The peat would most likely be used on Block Island because the small size of the wetlands and the relative isolation of the Island make production and transportation costs prohibitively high in competition with other mainland sources.

The resource calculation for the power plant, 24,248 tonnes of good quality peat from Ambrose and New Meadow Hill Swamp, is about 75% of the total resource of these two wetlands. Seventy-five percent of the useful tonnages for the entire island, 95,000 and 190,000, would yield 71,000 and 142,000 tonnes, respectively, of good quality peat for all wetlands. Thus, the power plant would have fuel for 14-28 years. It should be pointed out that this estimate is extremely conservative; a likely reserve could be 100% greater.

A resource calculation for use as a home-heating fuel can be based on heat values of peat versus wood. Best quality wood gives about 7500 Btu/lb; whereas an average peat value, based on the quality analyses, is 4000 Btu/lb, or about 50% of the wood heating value. If the average home in Rhode Island uses four cords of wood per year (1 cord wood = 1 ton peat), then 8 tons of peat are needed per home. Based on the useful tonnages, 95,000 and 190,000; 100 homes could be heated for 120-240 years, or 500 homes for 24-48 years. Again, this resource calculation is extremely conservative.

Block Island Economic Development Foundation, Inc.
Block Island, Rhode Island 02807

TO: Department of Environmental Management, Wetlands Division

FROM: Elliot Taubman, Block Island Integrated Energy Institutions, Project Director

SUBJECT: Preliminary determination as to a test dig of peat on Block Island

DATE: September 2, 1981

This memorandum ties together the separate applications which are being submitted for a test dig of peat on Block Island. While the applications are on seperate pieces of paper, they should be considered together for most purposes.

The points in favor of the proposed test dig are the following:

1. The intent of the test dig is to determine what the environmental and energy implications of the renewed use of peat will; these implications will not be appropriately tested unless the kind of experiment proposed is allowed.

2. A total amount of 500 cubic yards of peat will be obtained; this amount of digging will not be a significant alteration of any one wetland.

3. All substantial sized wetlands have been considered for possible digging, but the ones selected were chosen because of less apparent environmental damage, ease of access and because they appear to have been used for peat historically.

4. Migratory water fowl may have additional habitat if deeper water ponds are restored on the Island.

5. Increased availability of open water ponds would also enhance recreational opportunities. The ponds would be stocked with fresh-water fish, and would provide provide increased habitat for ducks, geese and teals.

6. Suitable habitat for the cage-culture of channel catfish is probable in ponds created by the harvesting of peat.

7. The wetlands chosen are not the primary habitat of any threatened or endangered species.

8. The peat obtained will be given away or sold at low rates to the year round Island population who presently suffer the highest energy costs and lowest per capita income in Rhode Island; the year round population historically relied on peat for home heating and this is why so many wetlands have already been disturbed on the Island.

9. The entire credibility of the peat experiment may hinge on whether any peat is actually used this coming winter.

10. The total environment on Block Island may be improved by digging peat: a) peat contributes less to air pollution than the wood and coal which are now commonly burned, b) the increase in wildlife habitat and recreational values previously alluded to, and c) the pond created would be used to augment the important upper perched water table.

11. The dug-out ponds which will be created in the mineral swamps involved will have all spoils removed.

12. A biologist trained in environmental impact, who was raised on the Island has been retained to monitor the actual digging of peat if this occurs in the later part of September or the earlier part of October.

Permission to dig peat at an average of 100 cubic yards per wetland is requested for a total of 500 cubic yards. The number of wetlands dug and the method of recovery is open to discussion. An analysis of the fauna and flora found in the subject wetlands is attached as are further comments by one of the Project biologists.

Block Island Economic Development Foundation, Inc.
Block Island, Rhode Island 02807

TO: Christine Ariel, Wetlands Division, Department of Environmental Conservation, State of Rhode Island

FROM: Elliot Taubman, Project Director, Block Island Integrated Energy Institutions Project and President, Block Island Economic Development Foundation, Inc.

SUBJECT: Further Information Regarding Wetland Preliminary Determinations for the Test Digging of Peat

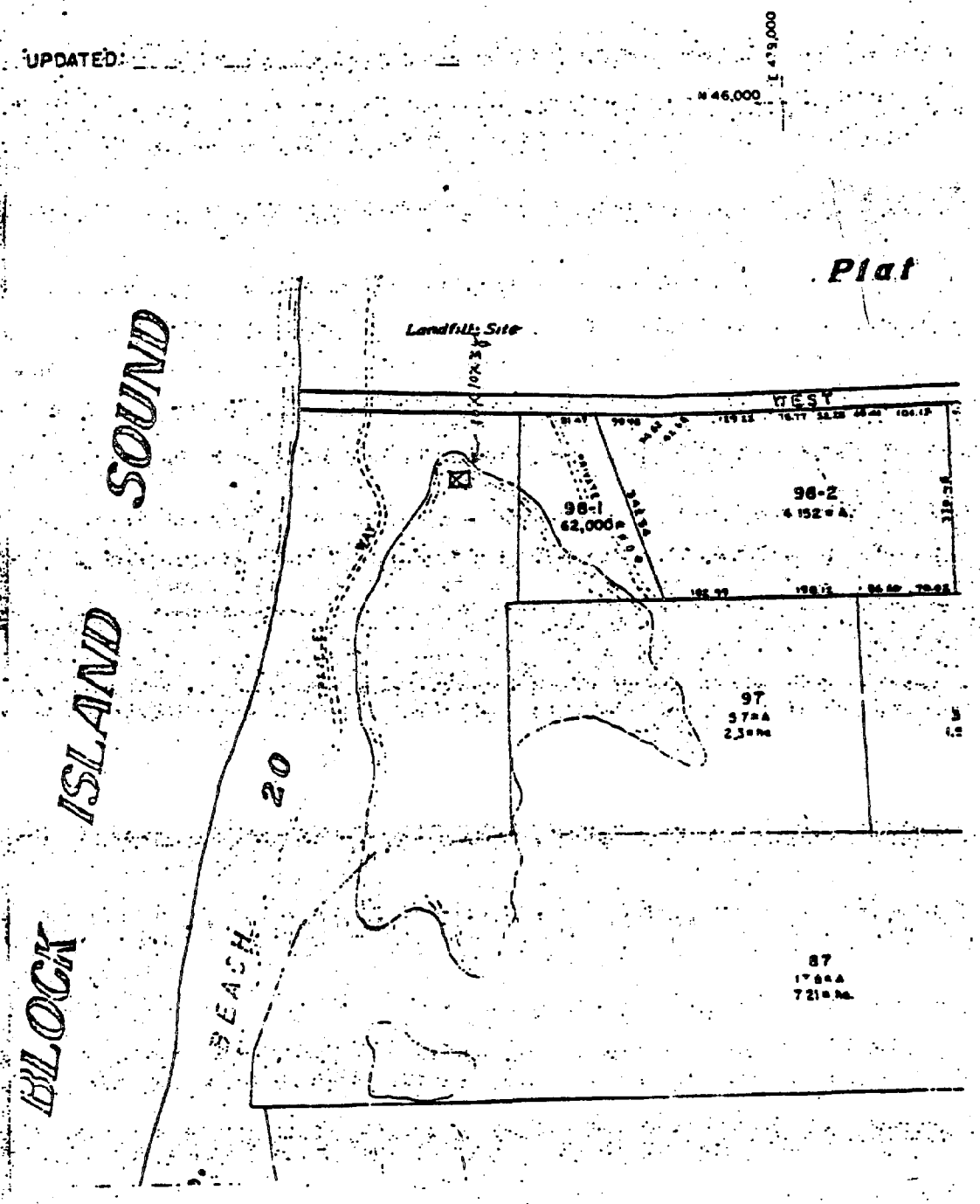
DATE: September 9, 1981

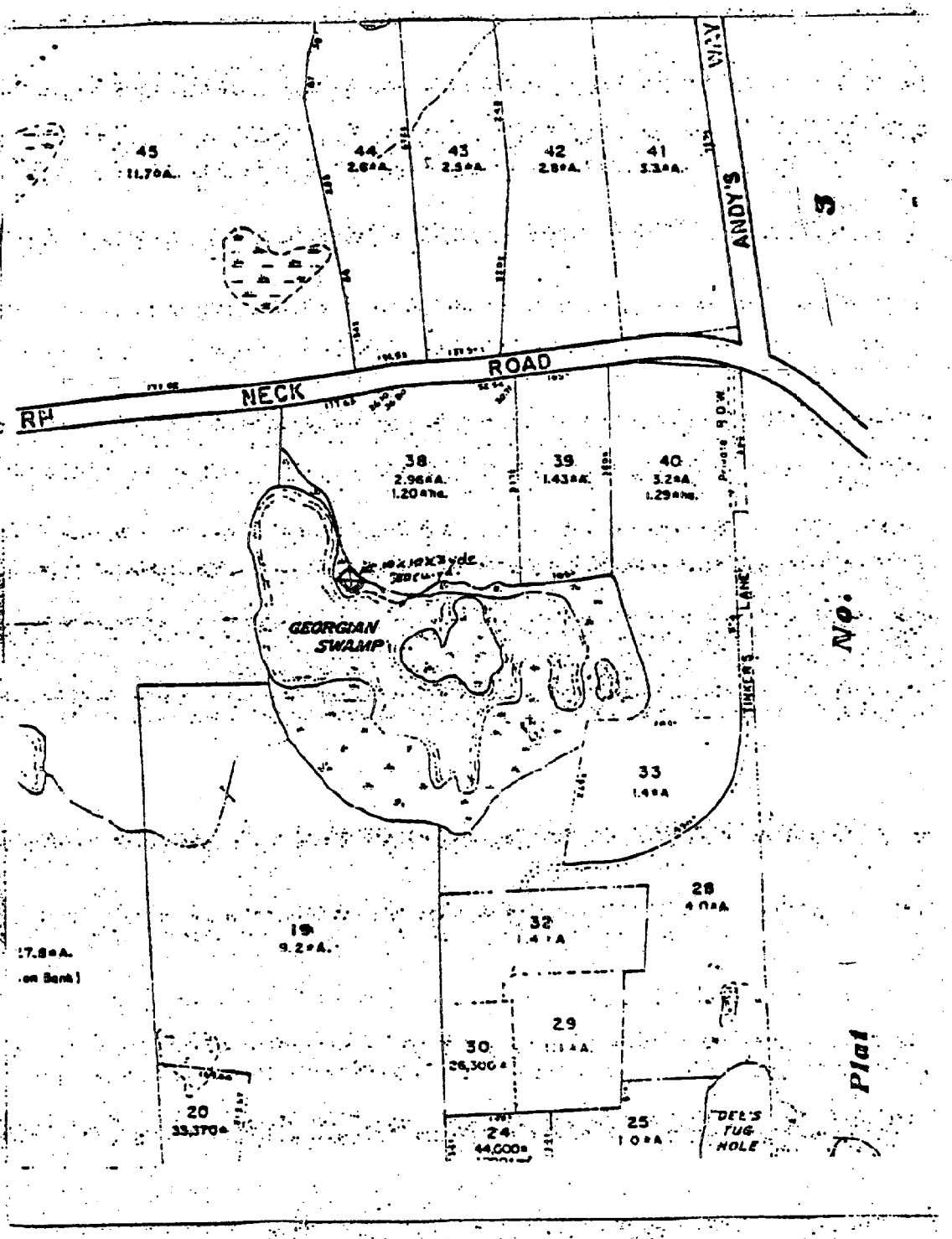
Attached are corrected maps of the proposed sites for the digging of peat. Also attached are the written authorizations of the property owners at each site. In three of the cases there has been a change in the precise site of the "box" for digging because of requests by the property owners. In the case of Ambrose Swamp and the Landfill South Swamp this is just a change of a few feet. In the case of Georgian Swamp the change was to put the test site on the west end of the existing large pond which was created by digging for peat (apparently the Mott and Littlefield families used peat for a very long time at that site).

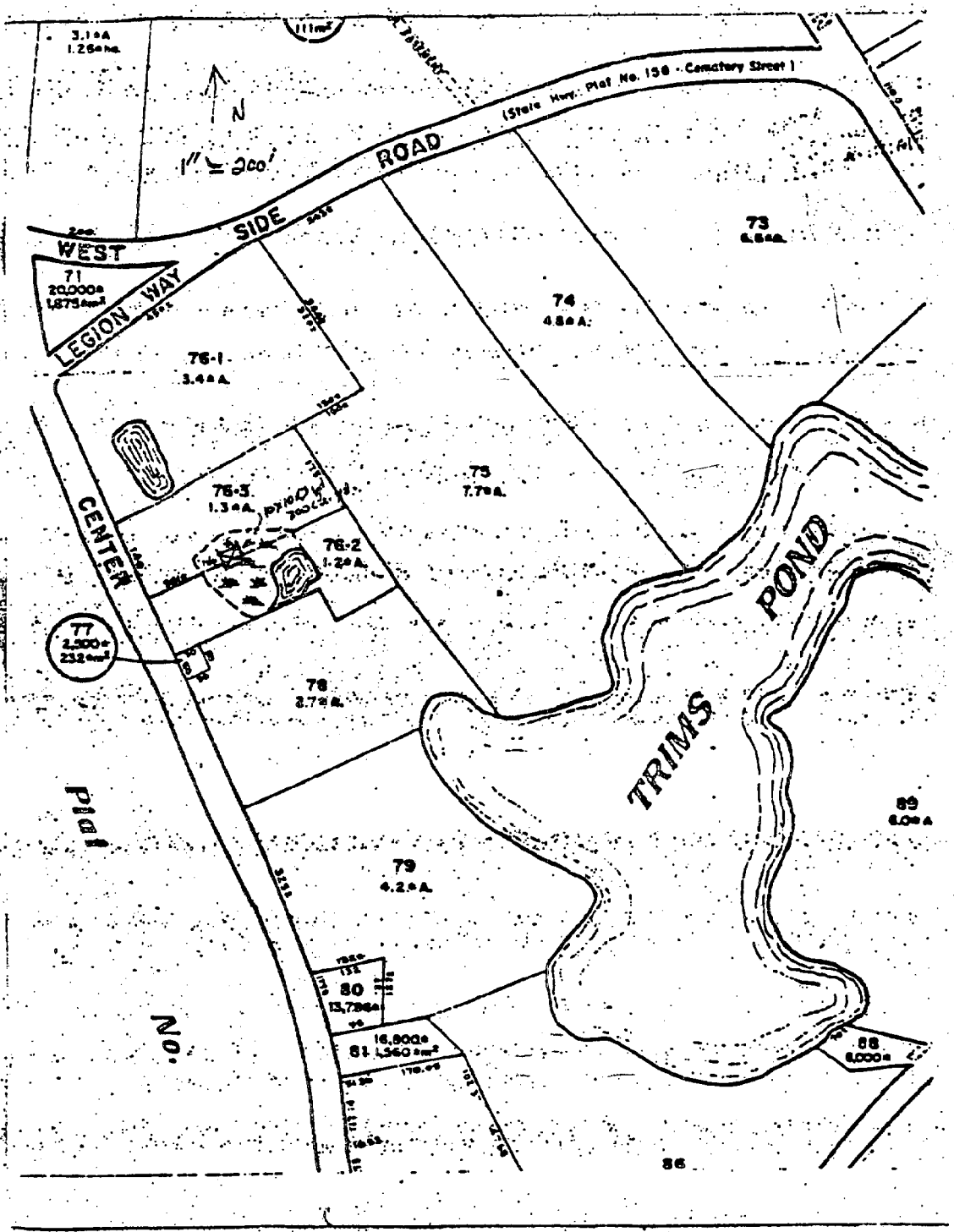
The method of digging will be to position a large crane on the solid bank of each wetland and to swing out a claw to the designated box of 10 yards X 10 yards X 3 yards and first remove the surface vegetation and ten go down to the tested peat depth to extract no more than 300 cubic yards from each site for a total of no more than 500 cubic yards from all four sites. The intention is to see the wetness of the material and either directly load the peat into dump truck for transport to either the landfill or other well drained site, or to leave the peat for two weeks (approximately) on the bank of each wetland. The peat would then be brought to the compactor for the creation of billets. As indicated before, a preference will be given to the Island senior citizens for the peat . We also intend to give some of the compacted peat to each of the property owners to insure their continued cooperation.

Please call if you have any further questions.

UPDATED:


N 46,000
E 49,000
Plat
Landfill Site
WEST
98-1
62,000
98-2
4.152 ac.
97
BLOCK
ISLAND
SOUND
BEACH
20
87


45
11.70A.
44
2.6±A.
43
2.5±A.
42
2.8±A.
41
3.3±A.
ANDY'S WAY
RD
NECK ROAD
38
2.96±A.
1.20±ac.
39
1.43±A.
40
3.2±A.
1.29±ac.
GEORGIAN SWAMP
LANE
33
1.49A
19
9.2±A.
32
1.41A
28
4.0±A
29
30
26,300±
20
33,370±
24
44,000±
25
1.0±A
DEL'S FUG HOLE
No.
Plat


N
1" = 200'
WEST SIDE ROAD
(State Hwy. Plat No. 158 - Cemetery Street)
LEGION WAY
CENTER
Plat No.
TRIMS POND
71
20,000±
1.875±ac.
73
74
4.8±A.
75
7.7±A.
76-1
3.4±A.
76-2
1.2±A.
76-3
1.3±A.
77
2,500±
232±m²
78
2.7±A.
79
4.2±A.
80
13,738±
81
16,800±
1,560±m²
88
6,000±
89
6.0±A.
86

RESOLUTION

BE IT RESOLVED that the Town of New Shoreham supports the application of the Block Island Economic Development Foundation to dig for peat on a test basis on Block Island. It is recognized by the Town that the Block Island Economic Development Foundation (BIED) has sought to be sensitive to environmental concerns as well as the economic well-being of the year-round Island residents. The test dig for peat will be for a small amount and will be done in the least destructive way possible.

BE IT FURTHER RESOLVED that two sites which have been identified for drying and compacting of peat are the Town Landfill and the State Highway Building, that the Town supports the use of these sites for storing, drying and compacting of peat.

BE IT FURTHER RESOLVED that use of Town land and facilities is specifically allowed for the purposes aforesaid and the Energy Committee of the Town is specifically authorized to participate in the above activities and represent the Town's interests in the digging and using of peat.

John F. Gray, First Warden

Nicholas A. DePetrillo, Second Warden

Kathryn Champlin, Council Member

H. Dennis Heinz, Council Member

F. Norris Pike, Council Member

Adopted unanimously by Town Council on October 5, 1981.

ATTEST: Edith Littlefield Blane, CMC
Town Clerk

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

Department of Environmental Management
DIVISION OF LAND RESOURCES
38 State Street
Providence, R. I. 02908

September 24, 1981

Block Island Economic Development Foundation, Inc. NO. 4910-4914
P.O. Box 277
Block Island, RI 02807

ATTENTION: Elliot Taubman

Dear Mr. Taubman:

Subject: Preliminary determination request for proposed peat extraction, Block Island, Rhode Islands

We have received the materials and reports submitted concerning experimental peat extraction on Block Island. Description of our findings may be found in the enclosed letters. In accordance with current policy we have concluded that major disturbances to existing wetland values will result in all four circumstances. Therefore, the formal approval of this Department will be required prior to beginning work.

In an effort to verify our findings and provide assistance in this matter the four wetlands under consideration have been evaluated by means of a wildlife habitat assessment model used by this Section. Both "Landfill South" and Amborse Swamp are considered "unique wetlands", thus increasing the potential for denial of your application under Section 5.03(6) of the Rules and Regulations. Georgian Swamp ranks "high" for wildlife habitat while the wetland associated with Trims's Pond at Red Gate Farm could not be given a relative value due to its small size. Please also note that Section 5.03(7) states that the application may be denied should the wildlife habitat value of a "valuable wetland" be reduced.

With these factors in mind it is our opinion that a formal application for removal of the entire required volume be submitted for either of the two latter wetlands, Georgian Swamp or Red Gate Farm marsh. These comments should in no way be construed to mean that approval of your proposal is assured. Rather they are offered to facilitate further action by your organization and the Town of New Shoreham.

We are aware of the timeliness of your request and will provide as much assistance as possible. If you have any questions please do not hesitate to contact this office (277-6820).

Very truly yours,

Peter M. Jaenaros, P.E.

Peter M. Jaenaros, P. E.
Chief
Division of Land Resources

CA/PMJ/db

Enclosures:

cc: Coastal Resources Management Council
W. Edward Wood
Governor's Energy Office
Victor Bell

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
83 State Street
Providence, R. I. 02903

September 24, 1981

Block Island Economic Development Foundation, Inc. APPLICATION No. 4914
P. O. Box 277
Block Island, RI 02807

Dear Mr. Taubman:

Kindly be advised that this Department has reviewed your Request for Fresh Water Wetlands Applicability Determination and inspected the site in the Town of New Shoreham, east of Corn Neck Road, south of Tinker's Way and as described by the site plan accompanying your request.

It is our conclusion that this proposal represents a significant alteration of a fresh water wetland for the following reasons: Your proposal involves the excavation of peat from Georgian Swamp, a fresh water marsh, resulting in the destruction of a wetland having "high" value wildlife habitat.

Therefore, formal application must be made on the enclosed form before further action can be taken by this Department. Upon receipt of your application, this Department will proceed with its processing as required by law.

A copy of the Fresh Water Wetlands Act is enclosed for your convenience. If you have any questions, please feel free to contact this office (phone: 277-6820).

Very truly yours,

Peter M. Jamaros, P.E.

Peter M. Jamaros, P. E.
Chief
Division of Land Resources

CA/PMJ/db

Enclosures(2)

cc: Victor Bell
Governor's Energy Office
Coastal Resources Management Council

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
83 State Street
Providence, R. I. 02903

September 24, 1981

Block Island Economic Development Foundation Inc.
P.O. Box 277
Block Island, RI 02807

APPLICATION NO. 4910

Dear Mr. Taubman:

Kindly be advised that this Department has reviewed your Request for Fresh Water Wetlands Applicability Determination and inspected the site in the Town of New Shoreham, southeast of the intersection of West Side Road and Center Road, Lots 76-2 and 75-3 and as described by the site plan accompanying your request.

It is our conclusion that this proposal represents a significant alteration of a fresh water wetland for the following reasons: Your proposal involves the excavation of peat from a fresh water marsh resulting in the destruction of wildlife habitat.

Therefore, formal application must be made on the enclosed form before further action can be taken by this Department. Upon receipt of your application, this Department will proceed with its processing as required by law. We note that your proposal may require review by the Coastal Resources Management Council.

A copy of the Fresh Water Wetlands Act is enclosed for your convenience. If you have any questions, please feel free to contact this office (phone: 277-6820).

Very truly yours,

Peter M. Jamieson, P.E.

Peter M. Jamieson, P. E.
Chief
Division of Land Resources
CA/PMJ/db

Enclosures(2)
cc: Coastal Management Council
Victor Bell
Governor's Energy Office

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
83 State Street
Providence, R. I. 02908

September 24, 1981

Block Island Economic Development Foundation, Inc.
P. O. Box 277
Block Island, RI 02807

APPLICATION NO. 4913

Dear Mr. Taubman:

Kindly be advised that this Department has reviewed your Request for Fresh Water Wetlands Applicability Determination and inspected the site In the Town of New Shoreham, west of Corn Neck Road, south of West Beach Road, lot 98-1 and an unnumbered lot locally referred to as "Landfill South" wetland.
and as described by the site plan accompanying your request.

It is our conclusion that this proposal represents a significant alteration of a fresh water wetland for the following reasons: Your proposal involves the extraction of peat from a fresh water marsh resulting in the degradation of the "unique" character of a wetland designated by the R.I. Natural Heritage Program.

Therefore, formal application must be made on the enclosed form before further action can be taken by this Department. Upon receipt of your application, this Department will proceed with its processing as required by law. Please note that your proposal may require review by the Coastal Resources Management Council.

A copy of the Fresh Water Wetlands Act is enclosed for your convenience. If you have any questions, please feel free to contact this office (phone: 277-6820).

Very truly yours,

Peter M. Jamieson, P.E.

Peter M. Jamieson, P. E.
Chief
Division of Land Resources

CA/PMJ/db

Enclosures(2)

cc: Coastal Resources Management Council
Victor Ball
Governor's Energy Office

Madison Swamp ---- Plat 5

Lot #76.2 H.L. Madison
Block Island, R.I. 02807

76.3 Heiron L Jesup
Huckleberry Hill Rd.
New Canaan Ct. 06840

78 Patricia C. Young
Lone Tree Farm Rd.
New Canaan, Ct. 06840

CBA Wetland ---- Plat 3
Dee's Tug Hole

10 St Caspian Associates Inc.
c/o E. Allen Van Deusen
120 Fox Den Rd.
Glastonbury Ct. 06033

11 Nicholas A. Heineman
Cider Mill Rd.
Stamford Ct. 06903

Plat 4

21 Milton Carrow
1104 Waverley Way
Mclean, Va. 22101

25 Ernest & Charlotte Christofferson
44Stewart Ave.
Waterbury Ct. 06705

28 Mary O. Tinker
Block Island, R.I. 02807

Georgian Swamp---- Plat 4

13 Elizabeth Mitchell
Block Island RI 02807

19 Byron Littlefield
Block Island RI 02807

28 Mary O. Tinker
Block Island RI 02807

33 Wm.&Thelma Murphy
37 Sunnymeade Rd.
Chatham Twp, N.J. 07928

33 Norma Mott Nordberg
Block Island, RI. 02807

Robert Sawyer
19 Gramerry St.
Rye N.Y. 10580

Hill So. Swamp ----Plat 3

97 Graham Wagenseil
c/o Selmo
19 Cold Spring Dr.
New Fairfield, Ct. 06810

97 Daniel&Elizabeth Olson
23 Chapel st.
Stratford Ct. 06497

98.1 John F Gray
Block Island, RI 02807

Plat 20 -xxxxxx

20 Town of New Shoreham-West Beach

xxxxxxxxxxxxxxxxxxxxPlatxxx

40 Richard P. Hayes
55 E. Center St.
Manchester Ct. 06040

Ambrose Swamp ---- Plat 3

Lot 215 [illegible] Brewer
Block Island RI. 02807

217 James & Eva Mott
Block Island RI. 02807

218 & 220
John & Mabel Thomas
Block Island, RI. 02807

219 Mary Jean Aull
Block Island RI. 02807

Lots-230,235,236,238,240,242,244,246,248,252
Joan P. Abeshouse
110 Beach Ave.
Woodmont, Ct. 06460

Lots-227,229,232,234,241,243,247,
Charles E. Drazen
First Bank c/o trust Dept.
P.O. Box 502
New Haven Ct. 06502

Lots-225,[illegible],231,233,237,239,245,249,
Jack I Drazen
c/o Hartford National Bank & Trust Co.
Morgage Dept.
777 Main St.
Hartford Ct. 06115

# U.S. peat activity mounting despite gov't cuts

By Chris Pope

CHICAGO — An official at the Institute of Gas Technology here was shocked one day when a group from Minnesota appeared in the office door carrying a chunk of local bog. After examining the sod, he was asked by the group if it could be used to produce synthetic gas.

That was seven years ago, and engineer Dharam V. Punwani remembers he was alarmed, then amused at the suggestion.

"I took a look at the slimy, stringy, wet stuff and laughed," Punwani, associate director of IGT's division of chemical processing research, recently recalled.

But the group, representing the Minnesota Gas Company (Minnegasco), a utility serving natural gas to 560,000 customers, persisted. Punwani, who became head of IGT's peat program, has been up to his elbows in bog ever since, as part of a DOE/IGT/Minnegasco effort to study the gasification potential.

What Punwani and associates discovered tells part of the story of why peat has become one of the hot topics in the U.S. alternative energy field.

By heating and pressurizing peat in the presence of hydrogen-rich gases (followed by a steam and oxygen mix, IGT's PEATGAS process can extract 9,250 cubic feet of gas, 14.2 gallons of oil, 40 pounds of ammonia and four pounds of sulphur for every ton of dry peat. That, according to Punwani, makes the United States a pioneer in peat gasification.

ITG's technology will be tested in a pilot plant next spring. Minnegasco is concurrently studying environmental impacts of harvesting and dewatering technologies as part of a feasibility study for an 80-million cubic-foot-per-day synthetic gas plant (the nation's first, with the thermal production of a 1000 MW power plant) it hopes to bring on line somewhere in northern Minnesota in 1986.

By one estimate, the plant, over a 20 year period, will consume 45,000 acres of peat harvested to a depth of six feet. Minnegasco's peat source: The Big Bog near Waskish in the northern part of the state, contained within the largest stretch of non-stop peat in the continental U.S.

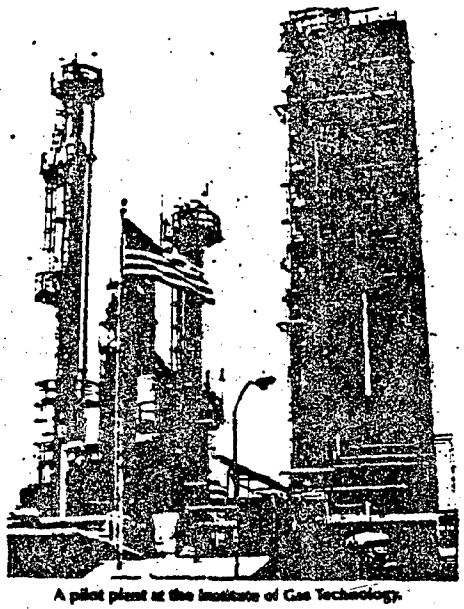
Minnesota is an obvious place for the peat revolution to take place. Within its borders lie 7.2 million acres of bogland, or one percent of the world total, comprising 16 billion tons of peat.

### Alaska a leader

But the peat-for-energy fever has caught on elsewhere as well. Eleven states have completed DOE peat resource studies, with Alaska topping the scales at 61.7-billion tons of peat resource (at 35 per cent moisture); Michigan with 16.5-billion tons; and Florida with three-billion tons.

The 80-million cf/d plant considered by Minnegasco, by comparison, would consume approximately 6.5-million tons of peat annually.

The industry, boasting its share of big-name companies, also appears to be healthy despite recent cutbacks of federal funding for peat R&D. Wheelabrator-Frye, an energy service



A pilot plant at the Institute of Gas Technology.

firm based in New Hampshire, is marketing a novel, cost-competitive technology it imported last year from Sweden. Known generically as wet-carbonization (a process researched by various other U.S. companies), the technology takes waterlogged peat off the bogs and bakes it under pressure into a combustible fuel compatible with oil-fired boilers (a plus for peat over coal).

The process boosts peat's available energy by 10 per cent or more, says John Rohrer, vice president of the company's energy department. It looks promising enough, he adds, that Wheelabrator-Frye plans construction of a peat processing plant in Maine, and is talking to industries interested in purchasing fuel from the future plant.

Studies are also underway at a Pittsburgh-based engineering firm, the Garvon Company, which is analyzing competing methods of harvesting and dewatering peat. Rockwell International and Boston-based Dynatech are exploring the relatively new fields of hydro gasification and alcohol-from-peat, respectively.

While enthusiasm is high for those with a stake in this potentially lucrative energy-supply venture, all contestants realize that several important factors could ruin peat development into the ground.

Principally, there is the question of whether peat production can satisfy the bevy of strict U.S. land, air and water standards. One respected environmental engineer, Dr. Marguerite Lofton, told CREN "It's the deciding issue: it will make or break the industry." She added that her firm, Williams Brothers of Tulsa, Oklahoma, hopes to win a $1.25 million grant to write the "definitive" study on peat's environmental impacts.

Then there is the all-important question of cost. Will peat be able to underprice coal?

Individuals like John Rohrer have few doubts, especially when potential users realize the slightly more expensive, but low-sulphur peat will not need the smoke-scrubbing equipment required of coal plants.

University of South Caroline Professor A.D. Cohen notes that U.S. peat exists in remote areas otherwise lacking in local energy supplies. This could be either beneficial or problematic, depending whether the region had a central demand for energy. Transport of peat more than 100 miles is presently considered uneconomic.

Federal funds—which peaked at $13-million in FY1981—appear to have dried up for peat R&D beyond FY1982, according to Mel Kopstein, manager of DOE's peat program. Whether or not industry will pick up the slack "is an uncertainty," Kopstein adds. "Generally, I would guess not."

In its favour, the mere physical potential of peat is one of its best selling points. Consider the following:

- Peat, an unexploited energy source in the U.S., is estimated to exceed the remaining, known, combined, energy potentials of national petroleum, lignite and conventional natural gas reserves.
- U.S. peat energy represents the equivalent of 240 billion barrels of oil., or 1443 quads of energy.
- Some 52.6 million acres of land are considered peatlands in the U.S. If dried to 35 per cent moisture, this represents 120.3 billion tons of fuel.

Then there is the question of whether peat bogs are renewable energy sources. From the standpoint of bog growth, which occurs at 100-200 centimeters per 1000 years, the answer is clear.

But proponents note that quickly maturing trees like alder and poplar, or cattails can be grown on partially harvested bogs as a source of renewable energy stock. First Colony Farms found that planting the processed area yielded normal growths of corn and soybeans.

# Canada

By Chris Wood

OTTAWA — What Canadian resource ministries now know about peat can be told in a nutshell: there's a lot of it; it burns, you can make useful things with it. What they don't know is very nearly everything else: precisely how much Canada has, what it costs to retrieve and dry it, and whether its use—as a fuel or an industrial feedstock—is indeed economic.

But new interest in the peatlands that cover huge areas of the country is evident from St. John's to Regina. There's a hint of gold fever—albeit brown, mucky gold—in the dry bureaucratic air, a sense that Canada has too long ignored the bonanza beneath the surface of its mournful muskeg.

**1914-1925: "The Golden Age"**

It was during World War One, with the prospect of oil short-

Ditching at Sisko

# Vast bulk of world's peat found i

By Mitchell Beer

While world resources are estimated at 427-million hectares (1.055-billion acres), a quirk of peat's global distribution makes it practically inaccessible to the majority of the world's population.

Assuming average bulk densities of 15 pounds per cubic foot and heating value of 6,000 BTUs per pound at 35 per cent moisture content, and an average bog depth of about two metres, a billion acres of peat would theoretically exceed the energy equivalent of 4.5 trillion barrels of oil. But of the total resource, only about 32.1-million hectares (79.3-million acres), or about seven per cent of the world total, can be found in developing nations.

### Soviets lead

With over one-third of the world's peatlands and 96 per cent of global peat production, the U.S.S.R. is an undisputed leader in the field. But according to a recent article in Pravda, Russia is now considering a variety of possible uses for peat besides power production.

"Until recently, peat has been used mainly as a fuel for electricity and heat generation," wrote Fedor Mayorov, deputy minister of geology, in an article translated and abridged by the Novosti Press Agency. "It was extracted from fields situated close to the place of consumption, and no account was taken of other important components present in it."

However, "in recent years Soviet scientists have discovered many hitherto unknown properties of peat, extending its sphere of use" to production of coke, semi-coke and fuel products, as well as light-weight building structures and insulation. As elsewhere, the primary use of peat in the U.S.S.R. is agricultural.

### Sweden, Ireland active

Besides Canada and the U.S. (see accompanying stories) and Finland (see pages 38 and 39), the two countries with major official plans to use their peat resources for fuel are Sweden and Ireland. In the three fiscal years ending in 1983-84, the Swedish government will allocate close to 18 per cent of its energy supply R & D budget to forest fuels and peat, second only to wind in total expenditures. By 2000, according to one Swedish Embassy publication, about 3.9 per cent of the country's anticipated energy supply will come from peat, a greater contribution than is expected from solar or wind.

Although 12 per cent of the country is covered with peatlands, a Swedish Institute fact sheet states peat utilization "is restricted by the transport problems involved, and by economic and environmental considerations." While "peat as a fuel is currently in an introductory state," states another institute backgrounder, as much as 1.3-million tons of fuel peat were extracted annually during World

Large caterpillar tracks allow this standard Irish tractor to negotiate peat bog's wet terrain.

# PEAT RESOURCES OF RED GATE FARM WETLAND
# BLOCK ISLAND, RHODE ISLAND

PREPARED FOR:

BLOCK ISLAND ECONOMIC DEVELOPMENT FOUNDATION INC.

BY

Colen R. Peters
Department of Geology
University of Rhode Island
Kingston, RI 02881

28 May 1982

**DRAFT COPY**

## WETLAND CLASSIFICATION

The 0.38 ha (0.95 acre) Red Gate Farm Wetland is dominated by *Typha angustifolia* (narrow-leaved cattail) and is classified as robust shallow marsh (SM-1; Plate 1, #42; Boothroyd et al., 1979). Short meadow emergents (Golet and Larson, 1974) are abundant on the uphill side of a surficial break-in-slope that borders the wetland on all but the east side (Fig. 1). Appendix 1 of Boothroyd et al., (1979) indicates the wetland (#42) covers 0.76 ha (1.9 acres) but this figure includes an area of salt marsh along the northeast edge of Trims Pond.

## FIELD PROCEDURE

Two cores (IA, IIβ) and 9 probes were taken at 10 m intervals along two traverse lines. Traverse line I is oriented approximately north-south and traverse line II is oriented east-west (Fig. 1). An additional 8 probes were taken along a grid pattern paralleling the traverse lines to better define the subsurface shape of the wetland.

Because the edges of the wetland are sloping, a topographic map (Fig. 2) was made so that accurate cross sections of the wetland (Fig. 3) could be constructed. Utility pole # 1272-SPC-4-35, at the northeast corner of the wetland, was used as a temporary bench mark (TBM). A relative datum of +100 m was selected for the elevation of two nails placed 0.48 m up from the base of the pole. Elevations on the topographic map (Fig. 2) and the cross sections (Fig. 3) refer to this datum.

## LABORATORY ANALYSES

Core IA measures 660 cm long and contains four peat types (Fig. 3). Seven samples from core IA have been sent to the Department of Energy's

## WETLAND CLASSIFICATION

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## LABORATORY ANALYSES

Core IA measures 660 cm long and contains four peat types (Fig. 3). Seven samples from core IA have been sent to the Department of Energy's

Grand Forks Energy Technology Center in North Dakota for proximate, ultimate and calorific analyses but results have not yet been returned. However, ash content of the core (IA) has been determined by the Sedimentology Research Group at the Department of Geology, University of Rhode Island, from which moisture-free (MF) BTU value of the peat can be approximated (Peters, 1981). Ash content and predicted BTU values of core IA appear in Table 1.

TABLE 1

| Sample depth (cm) | Peat Type | %Ash | Predicted MF BTU/lb |
|---|---|---|---|
| 50 | silty reed-sedge | 70.6 | 2833 |
| 150 | woody moss peat | 7.8 | 9537 |
| 250 | woody moss peat | 9.2 | 9387 |
| 360 | wood peat | 6.2 | 9708 |
| 450 | wood peat | 10.9 | 9210 |
| 550 | sedimentary | 30.7 | 7092 |
| 660 | sedimentary | 74.3 | 2435 |

Cross sections (Fig. 3) and preliminary ash and predicted BTU values (Table 1) indicate fuel-grade peat ( > 8000 BTU/lb MF, <25% ash; U.S. D.O.E., 1980) occurs between 100 and 480 cm below the wetland surface. The reed-sedge peat in the upper 100 cm and the sedimentary peat in the lower 180 cm are not fuel grade.

## PEAT RESOURCE

The peat isopach map (Fig. 1) was used to determine the volume of peat in Red Gate Farm Wetland. The area within isopach contour lines was determined with a planimeter and then multiplied by the 1 m contour

interval to compute volume. The tonnes of peat within each contour interval was determined by multiplying the volume by the moisture-free bulk density of peat (150 kg/$m^3$). Volume, moisture-free tonnes, and tonnes at 35% moisture of peat in Red Gate Farm Wetland appear in Table 2.

TABLE 2

| Contour Interval (m) | Volume ($m^3$) | Tonnes (MF) | Tonnes (35%) |
|---|---|---|---|
| 0-1 | 3820 | 570 | 880 |
| 1-2 | 1480 | 220 | 340 |
| 2-3 | 1220 | 180 | 280 |
| 3-4 | 1000 | 150 | 230 |
| 4-5 | 800 | 120 | 180 |
| 5-6 | 590 | 90 | 140 |
| 6-7 | 410 | 60 | 90 |
| 7- | 80 | 10 | 20 |
| | 9400 $m^3$ | 1400 tonnes MF | 2160 tonnes 35% m |

FUEL GRADE PEAT RESOURCE

Fuel-grade peat does not occur in the upper 1 m or the lower 2 m. Consequently, the fuel-grade resource of Red Gate Farm Wetland would exclude the tonnes of peat in the upper meter (570 tonnes MF) and the lower two meters (70 tonnes MF). Therefore the fuel-grade peat resource of Red Gate Farm is 760 moisture-free tonnes or 1170 tonnes at 35% moisture (air dried).

# REFERENCES

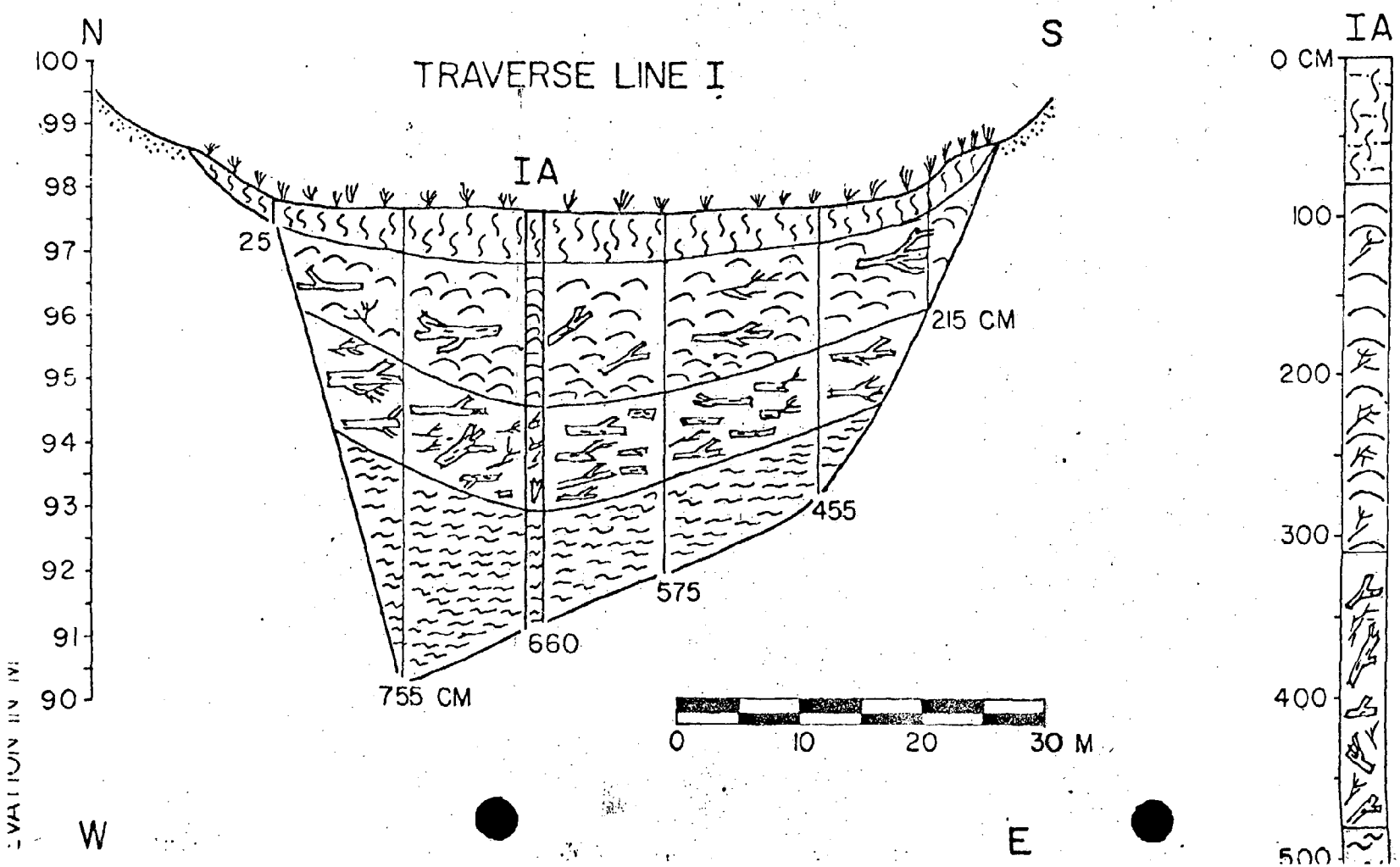

Boothroyd, J.C., Peters, C.R., and Pickart, A.J., 1979, Peat resources of Block Island: Technical report for Rhode Island Governor's Energy Office and U.S. Department of Energy, Grant No. DOEBO-365-8, 75 p.

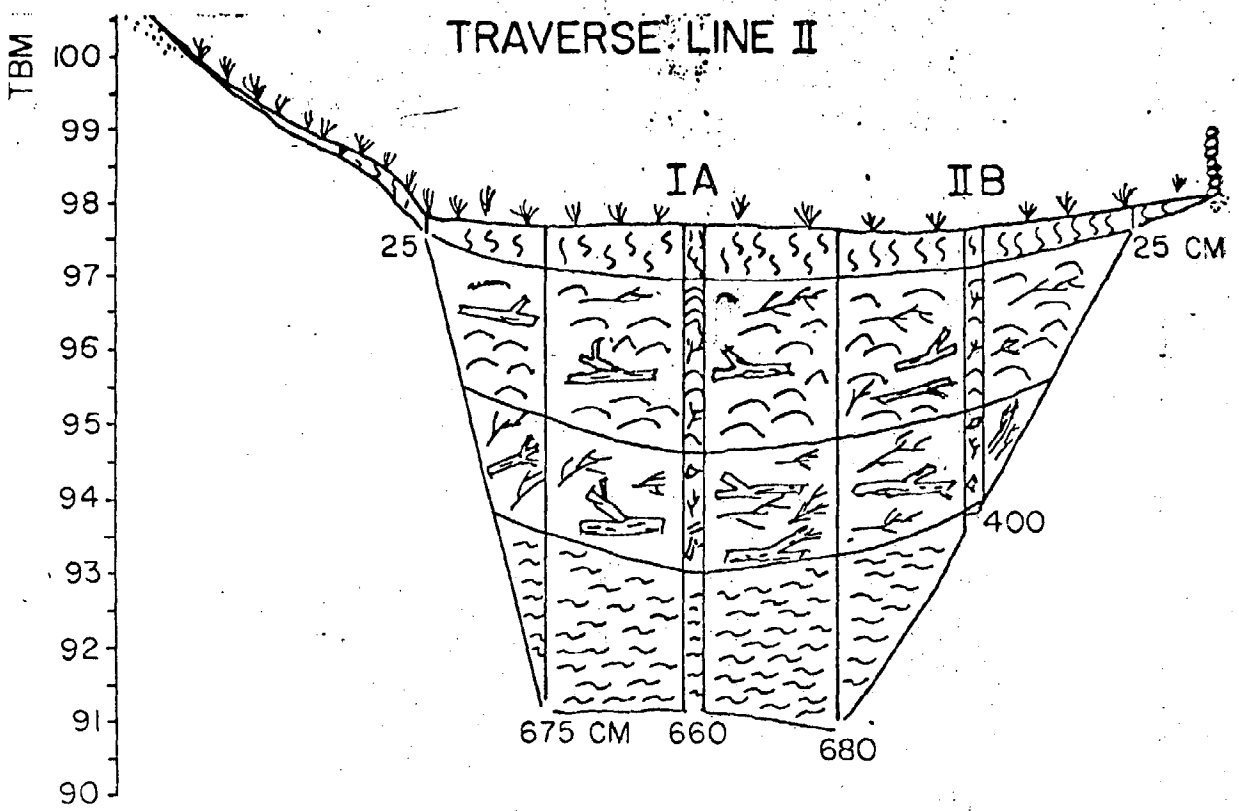
Golet, F.C. and Larson, J.S., 1974, Classification of freshwater wetlands in the glaciated northeast: U.S. Fish and Wildlife Serv. Resourc. Pub. 116, 56 p.

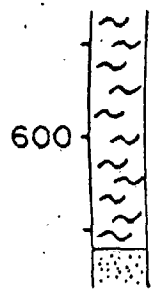
Peters, C.R., 1981, Peat resources of selected wetlands on Block Island, Rhode Island: unpub. M.S. thesis, Univ. Rhode Island, Kingston, RI, 137 p.

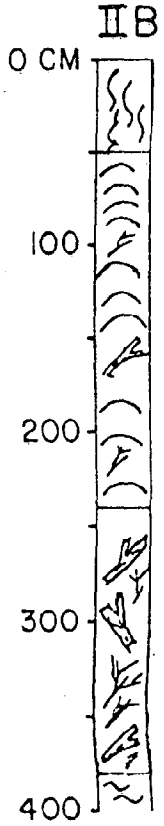
U.S. Department of Energy, 1980, Proceedings of the first technical contractor's conference on peat, Contract No. DEAC01 78ET10159, 332 p.

# FIG. 3
# CROSS SECTIONS AND CORE LOGS
# RED GATE FARM WETLAND
# BLOCK ISLAND, RI






## EXPLANATION

CORE IA

PROBE

PEAT TYPES

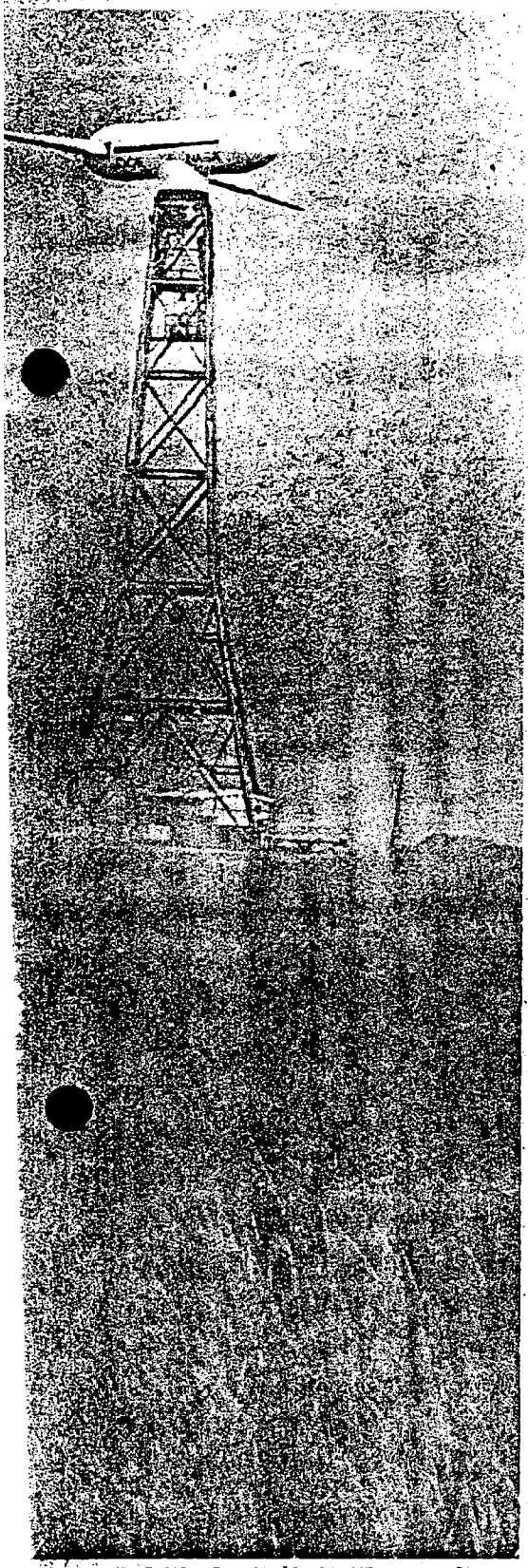
- REED-SEDGE
- MOSS
- WOOD
- SEDIMENTARY

**DRAFT COPY**

MAY 2 8 1982

Glen R. Peterson
Res. Assoc. III

# e Block Island saga:



BLOCK ISLAND'S WINDMILL: Cheers came immediately. The electricity didn't.

***When Block Island got a windmill, electric rates were supposed to drop. Instead, they rose. Islanders, who pay one of the country's highest rates, are mad at the power company. The company says they should be grateful.***

## By C. Eugene Emery Jr.

THE CRISP ocean breezes always blow strong on Block Island, but anyone visiting this quaint vacation spot these days is bound to get a whiff of something else in the air: discontent coming from residents who get their electric bills.

For two years, a giant, $4.2-million experimental windmill built by the federal government has been generating electricity for the island's 500 full-time residents.

But although the windmill has generated up to $50,000 worth of free power, islanders have not seen their electric rates drop one cent. In fact, only a few months after the windmill began generating electricity for the Block Island Power Company, the company asked for — and received — an $80,000 rate increase from the state Public Utilities Commission (PUC).

"I thought whatever electricity was generated would be passed out among the ratepayers," said Everett Littlefield, one of many residents upset by the rate increase.

For Block Islanders, whose summertime electric bills are nearly four times higher than what other Rhode Islanders pay, the dream of cheap energy has remained just that.

Since the federal Department of Energy began the project, it has been plagued with political and technical problems. But more than anything else, the windmill has fueled a longstanding controversy on Block Island over who controls the price of power on this remote summer hideaway.

The controversy is based on the intertwined relationship between the Block Island Power Company, which is overseen by the PUC, and Island Services, the private company that sells Block Island Power the fuel to run its five diesel generators.

Ninety percent of the stock in Block Island Power is owned by Franklin W. Renz, a tall, lean, clean-shaven gentleman whose receding hairline is broken by a lock of black hair. Renz also owns Island Services, the company that sells oil to the power company. And Renz Hauling Corporation rents a plane to the company.

The relationship is perfectly legal. That is not in dispute. Transactions between the power company and the fuel company are submitted to the PUC for prior approval, as required by law.

The question is whether the relationship keeps electric rates too high. Many on Block Island say that it does. Renz says that, to the contrary, the relationship keeps rates on the island from going even higher.

"I've heard both sides of the story and it's hard to sift out facts as to what is fair and what isn't fair," said one resident of the close-knit island, who asked not to be named. "I thought there were laws in this country against monopolies. I just know it's going to be increasingly difficult for people to meet these bills."

When Renz, of Block Island Power, asked the PUC for the rate increase, it was because the power company was too deeply in debt to Renz, of Island Services.

According to Renz's testimony before the PUC, the situation works like this:

When the Block Island Power Company needs diesel fuel, it does not go out to bid. Instead, Renz of Block Island Power makes a deal with Renz of Island Services. The markup on the fuel from Island Services to Block Island Power, Renz testified, is 15 percent.

"Island Services' responsibility is to

*C. Eugene Emery Jr. is a* Journal-Bulletin *staff writer.*

provide the fuel for the Power Company (at the best possible price)," he said, stressing later that Island Services' prices are "very competitive."

The fuel, brought in by barge, is stored in tanks owned by the power company and rented by Island Services for two cents a gallon, which includes the price of pumping the fuel from the barge.

When Block Island Power doesn't have enough money to pay Island Services for the fuel, it asks for a loan. Block Island Power doesn't go to the bank. The loan comes from Island Services.

Once again, Renz, the Island Services president, decides the interest rate that Renz, the power company president, will pay for the loan. According to PUC testimony, his contract with Block Island Power allows him to charge an interest rate two percentage points over the prime, although he doesn't always charge that much.

Renz said the loan is traditionally for about $100,000.

He also said that the price of fuel to the power company varies with the market. So each month, if oil prices jump, Island Services, which bought its fuel at a lower price months ago, immediately raises its price to the Block Island Power Company. Renz defended the practice, saying that when the price goes down, Island Services must pass the lower fuel cost to its customers and absorb the loss.

"The oil he's using now is at September prices, and yet he's charging us at the rate that prevails today," complained F. Albert Starr, the Town Council's lawyer.

A check with the state fuel allocation office showed that over the past several years diesel fuel prices have never dropped significantly.

In addition, Starr charged, Renz's Island Services charges Renz's power company as if the diesel fuel came from New Jersey via Providence, which makes the price artificially high. Renz said he no longer gets his fuel directly from New Jersey. Starr also suggested that if Renz went to a bank for his loan, the power company chief might be able to get the money at a slightly lower interest rate. Renz said he has gone to the island's two banks and been turned down.

But the overlap between Renz's two companies goes farther.

Island Services, Renz's fuel company, has no employees and no permanent office. When Renz is doing Island Services' work, he rents the power company office on Ocean Avenue, and charges himself $60 a month. In addition, the power company's computer is leased from Island Services.

When Renz is at his home in Connecticut, he drives a car paid for by Island Services and insured by the power company. "If I was going to the movies," he admitted at one point, "I would take it."

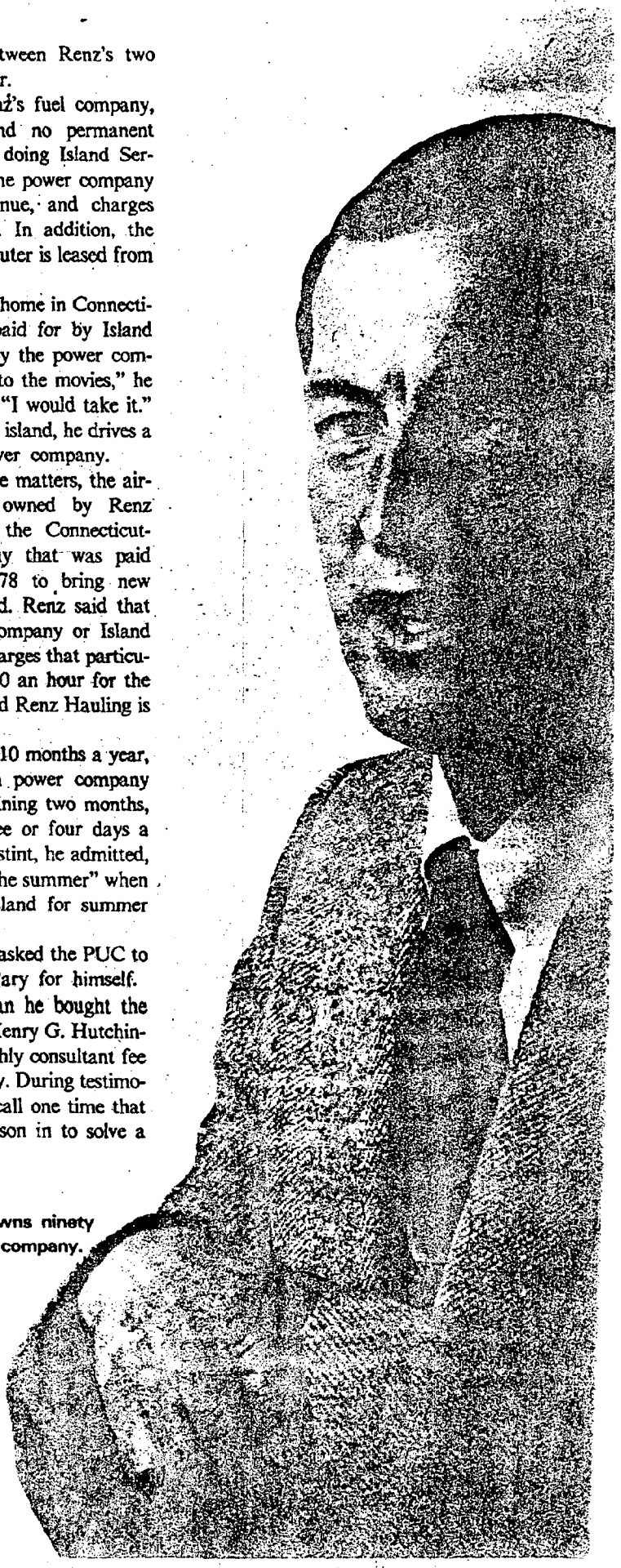
When Renz is on the island, he drives a car owned by the power company.

To further complicate matters, the airplane Renz flies is owned by Renz Hauling Corporation, the Connecticut-based moving company that was paid roughly $5,500 in 1978 to bring new generators to the island. Renz said that when he's on power company or Island Services business, he charges that particular company $60 to $80 an hour for the use of the plane. He said Renz Hauling is owned by relatives.

For one day a week, 10 months a year, he spends his time on power company business. For the remaining two months, he is in the office three or four days a week. That two-month stint, he admitted, comes "usually during the summer" when his family is on the island for summer vacation.

For his efforts, Renz asked the PUC to endorse an $18,000 salary for himself.

(By the way, the man he bought the power company from, Henry G. Hutchinson, gets a $1,000 monthly consultant fee from the power company. During testimony, Renz could only recall one time that he had to call Hutchinson in to solve a problem.)



**FRANKLIN W. RENZ owns ninety percent of the power company. Photograph by Anestis Diakopoulos.**

Renz says his power company badly needs his fuel company. Island Services, he says, keeps Block Island Power alive by buying fuel the utility couldn't afford, by letting Block Island Power make a few cents on every gallon of fuel that Island Services sells to private companies, and by not charging Block Island Power interest on overdue bills.

In addition, Renz said, the no-bid policy, the system of adjusting diesel prices monthly to match current rates, the loans between the fuel and power companies, and the dual ownership are all designed to keep electric rates low.

"The power company doesn't have the money to buy fuel," Renz said, contending that Block Island Power's loan requests have been turned down by the island's two banks.

Ask about the loans to himself and Renz will tell you that Island Services is now charging Block Island Power two points less than the prime (that was in the beginning of September).

Ask about the no-bid policy and Renz will say that his fuel company has managed to underbid other firms for town jobs, even though some of the profits from those sales go directly to the power company. In the past four or five years, he contends, "we've only lost one bid."

In fact, he adds, if the power company went out to bid for its fuel, the price would probably be even higher.

Renz insisted that the relationship between Block Island Power and Island Services is not unusual. "All utilities have a service company they buy fuel from," he said.

But Michael R. Postar, an attorney for the state Division of Public Utilities, said there are a few differences. Postar said the companies from which other utilities get their fuel are usually subsidiaries of a parent company. Island Services is separate from Block Island Power. The subsidiaries of other utilities do not make a profit on the fuel they sell to the power companies; Island Services does. The subsidiaries of other

**'If a utility system is able to generate hundreds of kilowatt hours less from its diesel generators, thanks to free wind electricity, the cost should be less.'**

utilities are regulated on the federal level. Island Services is not directly regulated by anyone. The Division of Public Utilities, which acts as an investigative body and represents the consumer at PUC hearings, argued unsuccessfully against the rate increase.

Renz says the relationship between Block Island Power and Island Services "is an open book" and that "any savings Island Services gets is put right through to the power company."

But Renz will not open his books to the town — although they are open to the PUC. Opening them to the town, he said, would hurt the fuel company, which would in turn hurt the power company, which would in turn hurt the power company's customers. He said the pricing formula is public knowledge, "so the profit picture is very easy to figure. I have nothing to hide."

Renz noted that Postar went through the books to be sure there wasn't any impropriety. "If the townspeople had access to the records," Renz added, "some of them would still say it's wrong."

Postar said his division isn't directly concerned with how much money Renz of Island Services is making. "If Island Services were earning a tremendous profit, but Block Island Power was getting a tremendous deal, that would be all right," he said.

"But the division found that Block Island Power is not getting a good deal," Postar said. "It could get a better deal."

"I would disagree with him," Renz responded. "And I know the books."

Photograph: Steve Woit

F. ALBERT STARR, lawyer for the Town Counc charges Island Services' prices are artificially hig

saved thousands in diesel fuel costs thanks to the windmill, the savings weren't being passed along to power company customers. Block Island Power was charging customers for oil it wasn't burning.

The reason, Renz testified, was that the power company had spent about $25,000 of its own money on maintenance and technical assistance for the windmill and expected to spend an additional $10,000 to $15,000 a year on the machine.

Renz later claimed that the windmill was forcing the power company to burn extra fuel because its diesel generators must now run at varying speeds to compensate for the comings and goings of the wind.

Like an automobile that burns more gasoline during stop-and-go driving, the generators were consuming roughly as much fuel to compensate for the windmill's power fluctuations as would have been saved if the windmill weren't working at all. "I'd estimate that we're about breaking even," Renz said in an interview.

The Department of Energy, anxious to make wind power attractive, has kept a low profile in the dispute.

Daniel Ancona, branch chief for DOE's large wind program, said that while the power company has the right to use the windmill-generated electricity to offset the costs of running the windmill, his department doesn't know if Block Island Power has saved more than it spent. "We'll know if they're charging a fair share by the end of the tests," he said. The project is scheduled to end in March.

Ancona confirmed that "there are indications that th

efficiency of the generators is decreased somewhat when they're running at part throttle." But he said he has seen no evidence that the extra oil needed to run the generators has wiped out the energy savings generated by the windmill.

"In our own minds, we verified that (Block Island Power) had saved $35,000 to $50,000," said Postar.

Postar added that the staff of the division of public utilities was "not convinced at all" by Renz's arguments. "If a utility system is able to generate hundreds of kilowatt hours less from its diesel generators thanks to free wind electricity, the cost should be less."

He said the company might have spent $35,000 of its own money for set-up and maintenance, but the savings should have been much more.

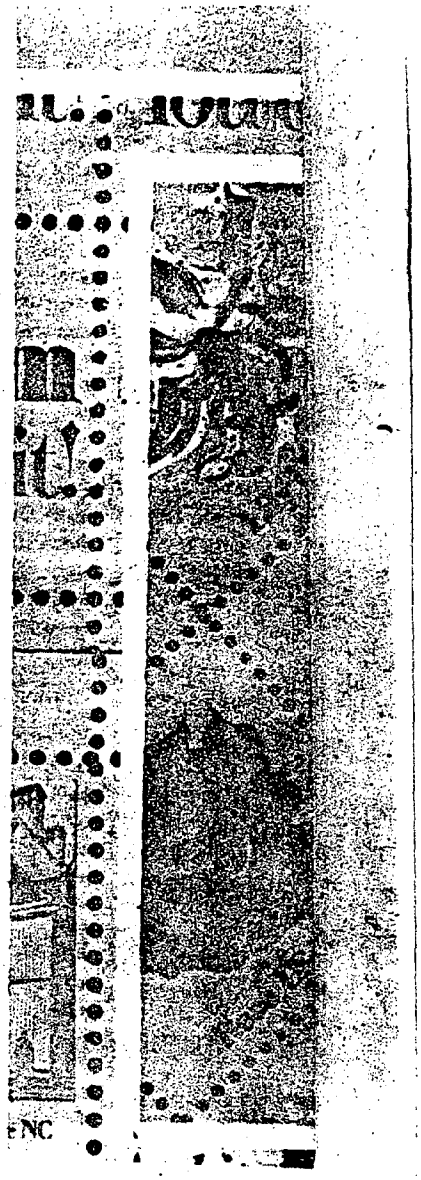
Some residents are also skeptical of Renz's explanations, claiming that Renz may be juggling his figures to keep power costs high. Starr, Block Island's solicitor, was blunt about how he feels about the figures: "I think it's a lot of baloney."

But the PUC didn't think so.

Although the Division of Public Utilities concluded that Renz's fuel company was charging the power company too much for its fuel, and that the power from the windmill should have prevented a rate increase, the PUC gave Block Island Power its $80,000 rate increase early last spring.

The figure included Renz's $18,000 salary, which the PUC noted was lower that Renz's predecessor, Henry Hutchinson.

In a recent interview, Public Utilities Commission Chairman Edward F. Burke said that when it comes to Block Island Power's fuel purchases, state and federal courts "have said our powers are limited to determining if it was (sold at) a fair marketplace price."



"We would not be in a position to say, 'Block Island Power will purchase fuel from this company rather than Island Services.' " Burke said. "But we would be able to say, 'Block Island Power, (the price you pay for fuel) is too high. Therefore, we will not allow it as part of your fuel charge.'

"There has been no satisfactory evidence before us of any dramatic profit being made by Island Services at the expense of the island's ratepayers," the PUC chief said.

"We didn't create the arrangement" between Island Services and Block Island Power, Burke said, "but we expect an arm's-length business-transaction approach" between the two.

The town is now challenging the PUC's decision in the state Supreme Court, contending that the PUC should have considered the relationship between Block Island Power and Island Services in setting the electric rates. "The PUC has shielded Island Services," said Starr. "We felt it was impossible to make a fair determination without tying the two companies together. They did not relate the loss from the power company to (what I assume were) big profits from the oil company."

The town is also challenging the PUC directly, saying it should have included the electricity generated by the windmill when it set its rates.

Starr said new figures submitted by Block Island Power in response to the PUC case show that the power company saved money with the windmill. Renz challenged that conclusion.

"This is truly the biggest ripoff," said Town Councilman Nicholas A. DePetrillo. "(Renz) is getting all the

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Public Utilities Commission) and gets a rate increase."

Renz admitted that he has a public relations problem. "Whenever anything like this happens, you're suspectful. That's human nature. There's always a problem, I believe, with any utility," he said.

"I have always been amazed at the fact that, in essence, the same company can sell the fuel to itself at a profit," said state Senator James J. Federico.

State Representative Edward P. Morrone said nothing has been done because the arrangement is legal and "because of the private nature of the business."

Federico said he is also at a loss to figure out a way to deal with the problem. "We have to be careful as legislators that we don't do anything hastily to drive the subsidiary and the power company out of business. That would give Block Islanders no power whatsoever."

"I don't think there's any way it's going to change," said one resident.

"The only alternative," said another, "is to go back to kerosene lamps."

In many ways, the windmill has been a disappointment.

Described by residents as "an airplane coming in for a landing," the 30-ton turbine was designed to produce 200 kilowatts of electricity, enough to power 60 average homes. (The latter figure was eventually downgraded to 35 homes.)

Sitting on a 93-foot tower, each blade was built to sweep around 40 times a minute when the wind was between 18 and 34 miles per hour. At higher wind speeds, the blades were designed to "feather," twisting to shut it down and prevent damage. "The winds are above cutout for relatively few hours a year," said Ancona, noting that the risk of damage to the windmill is "not worth the additional energy capture."

It was dedicated June 15, 1979, on a bright and breezy afternoon that may go into the history books as a day filled with hot air.

State politicians, bigwigs from the federal DOE and their entourages flocked to the island, followed by anxious television crews and news reporters who dutifully recorded John M. Deutch, acting under secretary for DOE, as he predicted that the mass of aluminum and steel could save the island — which has one of the highest electric rates in the country — more than $30,000 in fuel costs.

Block Island residents, Senator Claiborne Pell announced, "will be receiving about 50 percent of their electrical needs from the wind turbine. In view of the spiraling costs of crude oil on the world market, wind power will mean a great deal to Block Island power consumers."

The ceremonial switch was thrown and the windmill's two 62-foot blades began to turn swiftly.

The cheers came immediately. The electricity didn't.

Because of the novelty of wind power, DOE was anxious to avoid any and all bad feelings about the project. So when its experts warned that the spinning aluminum blades might interfere with island television reception, the feds promised to give Block Island a cable TV system to send television signals directly into each home.

But the cable TV system produced a simmering dispute among townspeople, local politicians and Block Island Power. The power company said it wanted to control the TV system. The Town Council resisted and the PUC agreed.

It took months to clear up the controversy. (The town and the power company eventually received joint management.) By the time the windmill was ready to run, the town still hadn't

HENRY G. HUTCHINSON, former power company owner, receives $1,000 a month in consultant fees.

price tag of more than $500,000.

So for over three months, as island diesel oil prices jumped from 94 cents to $1.09 a gallon, the windmill lay dormant. "The way we look at it," Ancona commented at the time, "the risks of causing problems for even a small group of islanders is not worth the risk of having wind energy get a bad name."

Finally, in September 1979, with the cable television hookups still not installed, the PUC agreed to let the windmill run, but not between the prime TV viewing hours of 5 p.m. to midnight.

It wasn't until March of last year that most of the hookups were completed and the PUC agreed to let the nine-month-old windmill run full-time.

"There's been lots of technical problems of the kind you have with experimental hardware, but generally the machines have run quite well," said Ancona. For example, the aluminum blades had to be replaced with wooden ones; DOE had to reduce the maximum turn speed of the blades.

Between then and mid-June, after close to 5,000 hours in operation, the windmill had produced about 400,000 kilowatt hours of electricity. "There are times when we can produce slightly more than 50 percent of the island's power demand," said Ancona. "On the average, we've been running between 10 and 20 percent due to the fact that in the summer and fall the island's demand is higher."

Renz blames the problems on the experimental nature of the windmill, insisting that the windmill hasn't been able to save any money for his company. If and when it does, he says, electric rates will be cut.

He said he "absolutely" expected to be able to cut his electric rates when the windmill came on line.

Once the operation is fine-tuned, he said, some savings will come.

## Renz says he 'absolutely' expected to be able to cut rates — but the windmill had problems.

"The first thing was to get the windmill working. Then you look at the finer things: do we go to batteries, do we change the frequency?" he said. "We may be able to solve the problems, but it's an experiment."

"We're doing the best we can to save fuel," Renz added.

But the federal government's role in the project is scheduled to end in March.

Renz said he would like to continue operating the windmill once DOE leaves, providing that DOE is willing to give Block Island Power the money to pay for spare parts for the prototype machine.

But if the feds stop paying for the parts, he explained, "we would have to take a strong look at the cost of maintenance. This is a highly technical machine."

If the power company doesn't want to keep the windmill, the feds will tear it down and go home.

Renz expressed satisfaction with the project. "We proved it can be done and put into a grid," he said.

But when it comes to getting power from other

windmills, Renz is less sanguine.

STATE ATTORNEY Michael R. Postar says the power company could get a better deal. Town councilman Nicholas A. DePetrillo says, "This is truly the biggest ripoff." Photography by Lawrence S. Millard.

When the PUC tried to draft rules forcing the power company to buy electricity from smaller, private windmills on the island, Renz, through his attorney, objected to the plan.

"The motivation for installation of a (private windmill) should be to provide electric energy for one's own needs and not to compete with the electric utility," said Peter V. Lacouture. Lacouture also argued that any windgenerated electricity the power company is forced to buy should be purchased at half price, that the individual windmill owner should pay to hook the windmill into the power company's grid, that the individual windmill owner should be forced to carry insurance to pay for any problems in the power company's lines and that the private windmill owner should be charged for shutting down the windmill every time the power company has to work on its line.

Postar said the arguments seem to indicate that Block Island Power doesn't want to use wind energy.

Rhode Island, under a federal mandate, has developed rules that require the large utilities to buy excess power from small alternative energy projects. As of the beginning of September, Block Island Power was the only utility that had objected to the regulations.

While Postar said the federal windmill hasn't been "as successful as we'd like," wind power is not dead. The rules requiring utilities to buy energy from private windmills should encourage wind power projects, he said.

In addition, "smaller projects with more certain technology may have a greater likelihood of succeeding," Postar commented. "If I had a business or home on Block Island, considering the tax advantages, I would seriously consider putting up a windmill and using the power myself. Even with a windmill that isn't operating too well, you can do all right."

Ancona, in fact, said industry is beginning to develop a strong interest in wind power. The timing is fortunate. The Reagan administration has dramatically slashed DOE's wind power research budget.

"It's beginning to look very promising that industry is going to take over from here," Ancona said.

But on windy Block Island, feeling toward the windmill project blows a little cool these days.

"We all desperately hoped the windmill would do some good," Starr said. "We were told it would probably keep electric rates from rising a lot faster than they had. But none of the benefit has been passed on to the subscribers. Now we only have cable TV, and we were getting along fine without it."

"I don't think the federal government expected the power company to hike its rates," DePetrillo said. "The federal government wanted experience with the windmill. But they also wanted people to have good feelings for wind power and they didn't get it." □